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# *Annual Report*

Nebraska. State Board of Agriculture

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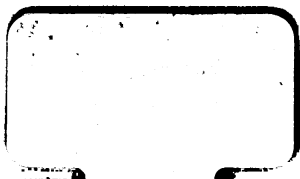


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# ANNUAL REPORT

NEBRASKA

## State Board of Agriculture

FOR THE YEAR 1903.

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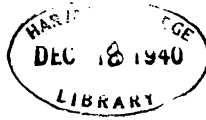
PREPARED BY

ROBT. W. FURNAS, SECRETARY.

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OMAHA, NEB.:  
KLOPF & BARTLETT Co., PRINTERS.  
1904

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*Harvard University  
Museum of Natural History*

STATE BOARD OF AGRICULTURE.  
OFFICE OF SECRETARY.

BROWNVILLE, NEB., January 31, 1904.

*His Excellency, John H. Mickey, Governor of Nebraska:*

SIR—In compliance with the law in this case made and provided, I hereby transmit the annual report of the Nebraska State Board of Agriculture for the year 1903.

Very respectfully,

ROBERT W. FURNAS, *Secretary.*



# PROCEEDINGS.

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## SEMI-ANNUAL MEETING.

---

LINCOLN, NEB., September 9th, 1903.

Semi-annual meeting Nebraska State Board of Agriculture met the above date and place, by order of President Dinsmore.

Present: J. B. Dinsmore, C. H. Rudge, W. R. Mellor, H. L. Cook, R. W. Furnas, G. W. Hervey, E. M. Searle, L. Morse, Ed. McIntyre, E. Filley, S. C. Bassett, G. R. Williams, E. L. Vance, Chas. Mann, W. W. Cole.

Mr. Dinsmore was appointed delegate to the American Association of Fairs and Expositions, and to the American Short-Horn Breeders' Association, and with power to represent this Board at any and all National Live Stock Associations that may meet at Chicago at same time in 1903.

G. W. Hervey and E. L. Vance were appointed delegates to the National Live Stock Association to meet at Kansas City in the year 1903.

It was ordered that all actual expenses incurred by each of the delegates appointed be paid and that the Board of Managers be instructed to issue warrants in payment of such expenses.

The delegate to the American Association of Fair and Exposition was instructed to obtain, if possible, Fair dates for 1904, the first week in September, and to follow Iowa.

## ANNUAL MEETING.

---

LINCOLN, NEB., January 19th, 1904.

In compliance with the provisions of law in this case provided, the Nebraska State Board of Agriculture this day convened in the New Chapel Hall of the University of Nebraska, and at 4 o'clock p. m. was called to order by the President.

### ROLL CALL.

On roll being called there were found to be present:

#### OFFICERS.

J. B. Dinsmore, President.  
W. E. Ewing, First Vice-President.  
W. C. Caley, Second Vice-President.  
Ed. McIntyre, Treasurer.  
Robert W. Furnas, Secretary.

## OFFICERS OF THE BOARD.

William Foster, General Superintendent.  
C. J. Tracy, Chief of Police.  
W. W. Cole, Superintendent Agricultural Hall.  
O. M. Druse, Master Transportation.  
E. M. Searle, Jr., Superintendent Gates.  
E. L. Vance, Superintendent Mercantile Hall.  
Chas. Mann, Superintendent Forage.  
Cyrus Horton, Superintendent Amphitheater.  
G. B. Simpkins, Superintendent Fish ex. and Fish Building.  
J. H. Hadkinson, Landscape Gardener.  
Prof. Charles E. Bessey, State Botanist for Board.  
Prof. Lawrence Bruner, State Entomologist for Board.  
Prof. E. H. Barbour, State Geologist for Board.  
Prof. H. H. Nicholson, State Chemist for Board.  
Prof. Goodwin D. Swezey, State Meteorologist for Board.  
Prof. H. B. Ward, Zoologist.  
Prof. A. T. Peters, Veterinarian.  
Prof. O. V. P. Stout, Engineer.

## MEMBERS OF THE STATE BOARD.

V. Arnold, Verdon, Richardson County.  
S. C. Bassett, Gibbon, Buffalo County.  
E. L. Vance, Pawnee City, Pawnee County.  
Chas. Mann, Chadron, Dawes County.  
E. McIntyre, Seward, Seward County.  
W. R. Mellor, Loup City, Sherman County.  
L. Morse, Benkelman, Dundy County.  
T. A. McKay, Aurora, Hamilton County.  
Peter Youngers, Geneva, Fillmore County.  
W. C. Hervey, Omaha, Douglas County.  
W. W. Cole, Neligh, Antelope County.  
W. Foster, Lincoln, Lancaster County.  
J. B. Dinsmore, Sutton, Clay County.  
R. W. Furnas, Brownville, Nemaha County.  
C. H. Rudge, Lincoln, Lancaster County.  
E. M. Searle, Jr., Ogallala, Keith County.  
Elijah Filley, Beatrice, Gage County.  
G. R. Williams, Irvington, Douglas County.  
H. L. Cook, St. Paul, Howard County.  
W. E. Ewing, Franklin, Franklin County.  
W. C. Caley, Creighton, Knox County.  
Thos. Mortimer, Stanton, Madison County.  
David Hanna, Woodlake, Cherry County.  
O. P. Hendershot, Hebron, Thayer County.

T. A. Minier, Craig, Burt County.  
 Samuel Riley, Albion, Boone County.  
 Cyrus Horton, Arapahoe, Furnas County.  
 R. M. Wolcott, Archer, Merrick County.  
 E. Z. Russell, Herman, Cuming County.

# REPRESENTATIVES FROM COUNTY AGRICULTURAL SOCIETIES.

We, your committee, respectfully report the following Presidents and Delegates entitled to seats as representatives of the following County Agricultural Societies:

County.	President.	Delegate.
Boone.....		J. Watson Riley.
Burt.....		J. R. Sutherland.
Butler.....	M. C. Delany.....	
Cedar.....	Z. M. Baird.....	
Chase.....		D. T. Mount.
Clay.....	W. F. Johnson.....	
Custer.....		F. H. Young.
Dawes.....	Chas. Mann.....	
Douglas.....		Chas. Grau.
Dundy.....	L. Morse.....	
Fillmore.....		H. P. Wilson.
Franklin.....	C. L. Owen.....	
Furnas.....		Chas. E. Laverick.
Gage.....	H. P. Crocker.....	
Hamilton.....	F. W. Hammond.....	
Harlan.....		M. B. Holland.
Hayes.....	G. Y. Kittle.....	
Hitchcock.....		W. Z. Taylor.
Holt.....	J. D. Grimes.....	
Jefferson.....	W. F. Downey.....	
Johnson.....		J. S. Drew.
Kearney.....	I. W. Hawes.....	
Knox.....	W. C. Caley.....	
Lancaster.....	S. R. Hall.....	
Madison.....	Mark Richardson.....	
Nemaha.....	D. E. C. Long.....	
Nuckolls.....	I. N. Brown.....	
Pawnee.....		E. L. Vance.
Polk.....	Thos. Klassy.....	
Richardson.....		G. A. Jorn.
Saunders.....	Henry Johnson.....	
Seward.....	W. E. Ritchie.....	
Sherman.....	M. C. Mulick.....	
Stanton.....	A. Spence.....	



Valley. . . . . A. J. Firkins. . . . .  
 York. . . . . M. B. Adkins. . . . .

Respectfully submitted.

W. R. MELLOR,

T. A. MINIER,

DAVID HANNA,

*Committee on Credentials.*

A quorum being present, the Board was declared by the President in order to transact business.

### PRESIDENT'S ANNUAL ADDRESS.

*Gentlemen of the State Board of Agriculture:* The flight of time has brought us to another annual meeting, a year has passed into history, whether the record be for good or bad, it is beyond our ability to alter.

The past year while one of profit to the agriculturist, has not been without its drawbacks and discouragements; the season was unpropitious for our great staple product, corn, much of which was planted late owing to the excessive rains during the latter part of May and early June, which retarded the growth of that already planted, and the planting of the remainder, much of the crop being over-run with weeds before the ground was in a condition to cultivate in a satisfactory manner.

We have rarely had a season with so little really good corn weather in the last thirty years.

Never can I remember when the corn planted remained green up to the middle of September as during the season just passed; the result of these conditions is quite a percentage of soft corn that will have to be fed at home or sold at a low figure.

Our wheat crop the State over is probably the largest ever raised; while prices have ruled low, the revenue per acre is a fair return on the investment.

Much of the State reports an abundant oat crop, which at the prices prevailing, must have proved remunerative.

Owing to the depression in the prices of cattle and hogs there is a wide-felt disappointment in the money return from grass fed to live stock, yet, on the whole, the agriculturist has no reason to complain at the outcome of the year's business, but should take lessons from the year's experience and at once prepare to drain his low lying lands, so as to prevent the excess of water lying on it to the prevention of timely cultivation.

More care should be exercised in the selection of seeds and the changing of the same from one location to another, thereby increasing the yield per acre and the net profit of the crop.

While much has been done in the past to improve the domestic animals of the State there is yet a very large and prolific field open in this direction, and we should bend every energy to encourage further progress along these lines.

The late fair was a success from the standpoint of both patron and the

management, the exhibits in all departments were large and of superior merit, as a rule; in some departments the exhibits were so numerous as to call for serious thought as to the advisability of placing restraining conditions about the departments, with a view to limit the number of animals one exhibitor may bring onto the grounds, while in other departments much encouragements to exhibitors is required.

The net result from a financial standpoint was all that could be expected, it leaves the Association in a condition to put further permanent improvements on the grounds, in the doing of which much thought should be given to those improvements as will be of a character to add to the comfort of our patrons, for as they are pleased so are our resources increased and our hold on the public sympathy and confidence strengthened.

The last Legislature made an appropriation of \$3,000.00 for the erection of a public comfort building. This was built mainly of brick and cement. While far from being adequate for the demand made on it, it was such an improvement over anything that we had ever had that it was by the public voted a success. Your management realize that it did not furnish more than one-third of the accommodation required; in view of this I would recommend that an addition be built as soon as possible, making its total capacity three times what it is at present.

There have been built during the past year two hog barns of the same general style and capacity of those heretofore built. There was also built a large and commodious sheep barn, 48x96 feet, which will amply provide for all demands made by this department for some years to come. These improvements cost \$2,248.00, which was paid for out of funds improvised by this Association.

The interest of our patrons in the fish exhibit call for more ample space; the building set apart for this display should as early as possible be replaced with a much larger and better one planned with a view to its needs and the accommodation of the public.

Our large live stock interests evidenced by the displays made, demand at our hands greater facilities for their exhibit in such a way that the public may examine them in comfort, and the stock be shown without being compelled to stand in the broiling sun while passing under the judges' review. This should be accomplished by the building of an amphitheater capable of seating some thousands of people at a time where the live stock may be shown in the center, out of the sun's rays, and in full view of their enthusiastic friends, who rest while they examine them—the most interesting exhibit on the grounds.

Several of the states have already provided themselves with such accommodations and report that of all the improvements on the grounds these prove the most satisfactory to the public.

To the end that this may be accomplished I recommend that you authorize your officers to buy, at the time of the wrecking of the buildings on the Louisiana Purchase Exposition grounds, of one or more of the buildings, thus securing the steel for the frame for the construction of such a building at a saving to this Association.

As the financial success of the Association depends on the number of pay admissions secured at the gates, we are vitally interested in the facilities and comfort with which our patrons are brought to and taken from the grounds. It must remain a matter of regret that the street car people do not avail themselves of the opportunity to enter the grounds and make their depot near that of the steam cars. To accomplish this, vigorous work should be commenced at once and persisted in till the desired end is accomplished.

The dates assigned us by the International Association of Fair Managers is August 29th to September 3rd, 1904, the week following the Iowa State fair; there will be held during the same week the Ohio and Minnesota State fairs. There was a very large attendance at the International Fair Managers' Association meeting, and a marked interest in the subjects presented for consideration.

As your representative I attended the meeting of the American Short Horn Breeders' Association. The attendance at this meeting was large and enthusiastic. They show a net surplus of over \$100,000.00 the larger part of which is invested in Government bonds, all of which has been accumulated during the last ten years, a marked contrast to their condition in 1894, when they were to all intents and purposes bankrupt.

We have for years deducted from the successful exhibitor 20% of his winnings, if over two dollars; it appears to me that this should be changed by the abolition of the rule. If necessary to have money thus raised, then let it be done by charging an entrance fee on the first premium competed for.

In closing I wish to return thanks to all members for the uniform kindness they have manifested in the alacrity with which they have responded to calls made for service to the board of managers. I wish to especially thank them for the earnestness with which they have served the interests of the board and responded to my various calls for assistance.

The railroads of the state gave us large and additional service during the last fair, which is shown by our increased receipts. This action on their part lays the Board under renewed obligations to them and makes plain the assertion often made that the roads can do much to make or mar the success of the fair; for this reason if for no other, we should strive to enlist their active interests in their behalf.

Before the close of this meeting I shall have returned to you the honor conferred on me a year ago; in doing so I wish to assure you that I have striven at all times to uphold the honor and dignity of the office, and of the Board, and to assure you that wherever placed as a member of the board in the future it will be my endeavor to serve the Board to the best of my ability.

#### TREASURER'S ANNUAL REPORT.

Treasurer McIntyre submitted his annual report as follows:

*E. McIntyre, Treasurer, to the Nebraska State Board of Agriculture:*

Jan. 20th, 1903.

Dr.

To balance from 1902 (see year book, page 9).....	\$1,557.42
To Cash from Furnas, acct. ground rental .....	20.00

Jan. 20th, 1903.		Dr.
To Cash borrowed 1st Nat'l Bank.....	500.00	
To Cash from Furnas acct. Grass Sold.....	45.00	
To Cash from Furnas acct. Speed Fines.....	50.00	
To Cash from Furnas acct. Speed Dept. Receipts.....	2,577.40	
To Cash from Furnas acct. Booth Dept.....	4,082.41	
To Cash from Furnas acct. Licensed Teams.....	215.15	
To Cash from Furnas acct. Stalls and Pens.....	1,161.00	
To Cash from Furnas acct. Camping Permits.....	29.50	
To Cash from Furnas Wm. Foster returned.....	2.65	
To Cash from Furnas C. H. Rudge acct. Fraternity Drill.....	10.00	
To Cash from Furnas Wilson acct. Lumber sold.....	3.00	
To Cash returned on Warrant No. 1.....	55.00	
To Cash returned on Warrant No. 127.....	8.50	
To 36,570 Gen. Adm. Tickets sold.....	18,285.00	
To 15,840 Amphitheater Tickets sold.....	3,960.00	
To 1,946 Quarter Stretch Tickets sold.....	486.50	
To 15,472 B. & M. R. R. Coupons.....	7,736.00	
To 278 Half B. & M. R. R. Coupons.....	69.50	
To State Annual Appropriation.....	3,000.00	
To G. W. Lindsay's check acct. Medals.....	5.20	

Total Liabilities..... **\$43,859.23**

Cr.

By Warrants paid, Series of 1897.....	46.58
By Warrants paid, Series of 1902.....	19.10
By Warrants paid, Series of 1903.....	37,605.66
To Balance.....	6,187.89

Total **\$43,859.23** **\$43,859.23**

Respectfully submitted,

Jan. 4th, 1904.

EDMUND MCINTYRE,  
*Treasurer.*

Examined, found correct, and approved this Jan. 19, 1904.

L. MORSE,  
SAMUEL RILEY,  
W. E. EWING,  
*Auditing Committee.*

Mr. McIntyre made the following remarks at close of reading his report:

McIntyre: To lots of you who would like to study dry statistics, I have prepared a tabulated statement of the financial affairs of the Board for the last dozen years or so, and any that would like a copy I will leave it on the Secretary's desk.

COMPARATIVE STATEMENT OF THE FINANCIAL AFFAIRS OF THE NEBRASKA STATE  
BOARD OF AGRICULTURE.

YEAR	BALANCE	GENERAL ADMISSION	AMPHITHEATER	STRETCH	R. R. COUPONS	CONCESSIONS	SPEED DEPARTMENT	STALLS AND PENS
1891.....	\$13,405.25	\$11,577.00	\$2,439.25	\$654.50	\$15,165.00	\$3,730.00	\$3,662.00	\$916.50
1892.....	15,234.89	11,902.50	2,761.50	542.00	13,203.50	3,357.50	5,142.95	1,234.50
1893.....	13,970.43	9,411.50	1,826.75	281.00	4,473.35	3,229.65	4,251.00	813.50
1894.....	2,978.58	7,977.50	1,590.00	200.00	8,756.25	2,026.50	2,572.50	841.05
1895.....	4.88	23,590.00	5,757.00	68.50	8,663.25	3,482.30	3,834.00	1,205.34
1896.....	1,089.88	18,617.50	2,096.75	313.00	6,790.00	2,934.50	3,937.20	487.25
1897.....	332.95	14,672.00	2,938.25	203.50	.....	2,695.10	3,312.54	1,278.42
1898.....	1,448.86	.....	.....	.....	.....	.....	.....	.....
1899.....	445.52	9,717.50	1,952.75	61.00	7,038.25	2,183.79	1,228.90	454.66
1900.....	244.46	12,522.50	2,196.50	119.50	5,749.00	2,063.05	1,046.45	723.55
1901.....	391.73	15,511.00	2,565.50	193.50	7,288.00	2,302.41	2,005.75	810.00
1902.....	2,548.26	18,285.00	3,960.00	486.50	7,805.50	4,082.41	2,577.40	1,161.00
1903.....	1,557.42	.....	.....	.....	.....	.....	.....	.....

YEAR	WAGON PERMITS	CAMPING PERMITS	STATE APPORTIONMENT	SCORE CARD	MISCELLANEOUS ITEMS MONEY BORROWED	FORAGE	FAIR WHEN HELD	TOTALS FOR ALL SEASONS
1891.....	\$452.50	\$137.00	\$2,000.00	\$75.00	\$1,106.61	\$411.90	Lincoln	\$51,732.51
1892.....	303.50	147.00	2,000.00	50.00	564.41	691.55	Lincoln	57,063.80
1893.....	182.00	109.50	2,000.00	75.00	706.00	427.25	Lincoln	41,717.33
1894.....	75.00	60.00	2,000.00	60.00	642.27	336.30	Lincoln	27,592.65
1895.....	57.00	21.50	2,000.00	87.50	5,927.05	444.80	Omaha	53,158.62
1896.....	82.00	3.00	2,000.00	100.00	2,445.94	262.80	Omaha	41,921.17
1897.....	129.00	10.50	2,000.00	75.00	3,238.05	391.00	No Fair	38,839.54
1898.....	94.00	.....	.....	.....	130.00	.....	Omaha	1,578.86
1899.....	.....	31.50	6,000.00	.....	332.95	.....	No Fair	778.45
1900.....	40.50	29.00	3,000.00	.....	3,860.73	.....	Lincoln	32,773.04
1901.....	184.00	25.00	3,000.00	100.00	822.08	.....	Lincoln	28,962.36
1902.....	160.00	29.50	3,000.00	.....	1,594.66	.....	Lincoln	38,195.08
1903.....	215.15	.....	3,000.00	.....	744.35	.....	Lincoln	43,859.23
								\$458,178.64

TREASURER McINTYRE'S FINANCIAL STATEMENT.

*E. McIntyre, Treasurer, credit, by warrants paid, series A. D. 1993, to-wit.,*

No.		No.		No.	
1. ....	250.00	45. ....	11.24	89. ....	19.21
2. ....	10.00	46. ....	674.02	90. ....	12.00
3. ....	28.25	47. ....	1.40	91. ....	120.25
4. ....	10.00	48. ....	1.00	92. ....	100.00
5. ....	10.00	49. ....	3.75	93. ....	166.60
6. ....	50.00	50. ....	40.00	94. ....	50.00
7. ....	166.65	51. ....	15.75	95. ....	16.95
8. ....	130.00	52. ....	1.00	96. ....	199.10
9. ....	6.94	53. ....	.75	97. ....	12.00
10. ....	2.40	54. ....	75.00	98. ....	6.00
11. ....	5.22	55. ....	166.65	99. ....	3.00
12. ....	11.50	56. ....	50.00	100. ....	30.00
13. ....	7.05	57. ....	2.00	101. ....	6.00
14. ....	45.00	58. ....	.74	102. ....	500.00
15. ....	12.55	59. ....	20.00	103. ....	55.00
16. ....	166.65	60. ....	25.75	104. ....	30.70
17. ....	50.00	61. ....	166.65	105. ....	100.00
18. ....	29.20	62. ....	50.00	106. ....	15.00
19. ....	26.45	63. ....	75.00	107. ....	3.00
20. ....	22.15	64. ....	34.41	108. ....	3.00
21. ....	.00	65. ....	29.02	109. ....	10.60
22. ....	58.70	66. ....	1.25	110. ....	23.25
23. ....	9.60	67. ....	8.50	111. ....	44.75
24. ....	3.15	68. ....	9.35	112. ....	16.00
25. ....	8.59	69. ....	.00	113. ....	8.00
26. ....	1.26	70. ....	36.00	114. ....	70.00
27. ....	22.00	71. ....	20.10	115. ....	60.00
28. ....	2.50	72. ....	166.65	116. ....	67.25
29. ....	166.65	73. ....	50.00	117. ....	15.00
30. ....	50.00	74. ....	10.97	118. ....	5.30
31. ....	6.12	75. ....	.00	119. ....	1,000.00
32. ....	7.52	76. ....	19.38	120. ....	40.00
33. ....	200.00	77. ....	30.75	121. ....	20.00
34. ....	27.50	78. ....	1.50	122. ....	12.00
35. ....	2.75	79. ....	10.00	123. ....	12.00
36. ....	1.90	80. ....	7.35	124. ....	5.00
37. ....	2.50	81. ....	.00	125. ....	60.45
38. ....	22.40	82. ....	75.00	126. ....	16.00
39. ....	8.00	83. ....	.00	127. ....	8.50
40. ....	8.00	84. ....	320.00	128. ....	235.00
41. ....	166.65	85. ....	.00	129. ....	18.80
42. ....	50.00	86. ....	53.60	130. ....	19.00
43. ....	.00	87. ....	150.00	131. ....	51.00
44. ....	10.16	88. ....	28.35	132. ....	88.00

No.		No.		No.	
133.	9.00	179.	24.00	225.	60.00
134.	72.50	180.	25.50	226.	55.00
135.	25.00	181.	36.00	227.	30.00
136.	.75	182.	36.00	228.	320.00
137.	6.00	183.	12.00	229.	100.00
138.	23.40	184.	14.65	230.	195.00
139.	16.00	185.	32.55	231.	30.00
140.	6.00	186.	25.00	232.	540.00
141.	48.85	187.	16.00	233.	55.00
142.	21.00	188.	20.67	234.	50.00
143.	12.20	189.	48.00	235.	60.00
144.	8.75	190.	34.60	236.	87.50
145.	24.85	191.	17.50	237.	11.25
146.	15.00	192.	9.00	238.	90.00
147.	202.68	193.	80.00	239.	10.00
148.	35.00	194.	10.00	240.	600.00
149.	100.00	195.	29.00	241.	50.00
150.	61.40	196.	50.00	242.	30.00
151.	62.00	197.	50.00	243.	30.00
152.	22.00	198.	60.00	244.	120.00
153.	29.55	199.	50.00	245.	3.75
154.	41.00	200.	44.00	246.	15.00
155.	28.25	201.	120.00	247.	18.75
156.	92.10	202.	50.00	248.	.00
157.	89.80	203.	100.00	249.	46.00
158.	26.65	204.	7.50	250.	9.00
159.	20.25	205.	15.00	251.	.00
160.	16.00	206.	20.00	252.	210.00
161.	34.77	207.	60.00	253.	15.00
162.	18.00	208.	135.00	254.	30.00
163.	209.20	209.	225.00	255.	163.90
164.	70.00	210.	15.00	256.	17.50
165.	737.00	211.	25.00	257.	110.85
166.	28.04	212.	100.00	258.	210.75
167.	47.75	213.	30.00	259.	2.85
168.	53.80	214.	25.00	260.	25.00
169.	53.20	215.	200.00	261.	20.00
170.	74.30	216.	50.00	262.	25.00
171.	100.00	217.	100.00	263.	6.00
172.	12.00	218.	50.00	264.	16.42
173.	49.05	219.	450.00	265.	6.00
174.	20.00	220.	66.00	266.	7.50
175.	19.85	221.	34.00	267.	16.00
176.	15.00	222.	225.00	268.	25.00
177.	36.00	223.	271.25	269.	21.25
178.	36.00	224.	5.00		

No.		No.		No.	
270.	25.00	316.	50.00	362.	9.00
271.	15.00	317.	50.00	363.	80.60
272.	35.00	318.	35.00	364.	1.50
273.	35.94	319.	35.00	365.	12.50
274.	120.00	320.	100.00	366.	213.50
275.	6.00	321.	150.00	367.	.00
276.	2.50	322.	50.00	368.	23.75
277.	157.50	323.	71.75	369.	6.00
278.	4.00	324.	2.62	370.	2.82
279.	146.25	325.	562.56	371.	24.00
280.	41.62	326.	1.50	372.	11.00
281.	87.50	327.	40.00	373.	8.00
282.	8.50	328.	89.75	374.	9.00
283.	14.00	329.	70.00	375.	10.00
284.	146.25	330.	42.00	376.	4.00
285.	10.00	331.	200.00	377.	10.50
286.	2.25	332.	6.90	378.	240.00
287.	10.25	333.	95.51	379.	115.40
288.	1.50	334.	155.77	380.	112.40
289.	7.00	335.	3.00	381.	108.60
290.	36.00	336.	20.00	382.	106.60
291.	21.75	337.	.00	383.	99.80
292.	35.00	338.	16.00	384.	98.20
293.	118.90	339.	10.50	385.	93.40
294.	692.80	340.	14.00	386.	32.00
295.	3.00	341.	25.00	387.	91.80
296.	18.70	342.	.00	388.	80.00
297.	70.11	343.	327.35	389.	.00
298.	8.00	344.	250.00	390.	80.00
299.	10.00	345.	41.25	391.	30.00
300.	8.00	346.	29.43	392.	.00
301.	300.00	347.	103.38	393.	80.00
302.	200.00	348.	500.00	394.	30.00
303.	200.00	349.	138.90	395.	80.00
304.	200.00	350.	8.75	396.	80.00
305.	200.00	351.	200.00	397.	250.00
306.	200.00	352.	1,298.00	398.	10.00
307.	24.25	353.	60.00	399.	29.10
308.	14.65	354.	4.45	400.	10.00
309.	63.16	355.	19.85	401.	7.20
310.	450.00	356.	7.00	402.	1.00
311.	764.06	357.	255.45	403.	1.00
312.	16.00	358.	26.51	404.	3.50
313.	75.00	359.	10.00	405.	1.00
314.	40.00	360.	36.75	406.	1.00
315.	35.00	361.	32.00	407.	4.00



No.		No.		No.	
408.....	1.50	454.....	2.00	500.....	6.00
409.....	8.00	455.....	2.00	501.....	22.30
410.....	32.00	456.....	2.00	502.....	2.00
411.....	28.80	457.....	3.00	503.....	.00
412.....	20.00	458.....	3.00	504.....	8.00
413.....	75.80	459.....	1.00	505.....	1.50
414.....	26.10	460.....	2.00	506.....	1.00
415.....	16.00	461.....	2.00	507.....	3.50
416.....	49.60	462.....	1.00	508.....	11.00
417.....	4.00	463.....	1.00	509.....	4.00
418.....	68.00	464.....	5.50	510.....	1.00
419.....	186.40	465.....	2.00	511.....	2.00
420.....	4.80	466.....	.50	512.....	3.00
421.....	30.30	467.....	3.00	513.....	2.00
422.....	106.80	468.....	1.50	514.....	.50
423.....	2.40	469.....	9.70	515.....	5.50
424.....	47.70	470.....	.75	516.....	5.25
425.....	2.40	471.....	10.40	517.....	2.00
426.....	1.50	472.....	7.00	518.....	1.75
427.....	6.30	473.....	1.50	519.....	1.25
428.....	3.50	474.....	1.00	520.....	3.00
429.....	2.40	475.....	2.00	521.....	3.00
430.....	1.00	476.....	3.20	522.....	1.00
431.....	.50	477.....	76.10	523.....	3.20
432.....	38.30	478.....	24.80	524.....	29.60
433.....	1.50	479.....	12.60	525.....	12.00
434.....	8.30	480.....	25.60	526.....	47.20
435.....	2.40	481.....	4.00	527.....	89.60
436.....	16.90	482.....	8.00	528.....	41.70
437.....	2.40	483.....	18.30	529.....	9.60
438.....	2.00	484.....	86.40	530.....	.00
439.....	2.00	485.....	13.60	531.....	55.30
440.....	8.00	484.....	4.00	532.....	19.50
441.....	12.00	487.....	15.00	533.....	1.00
442.....	12.00	488.....	14.40	534.....	1.00
443.....	1.00	489.....	8.70	535.....	1.00
444.....	13.00	490.....	15.00	536.....	16.00
445.....	4.50	491.....	.00	537.....	4.00
446.....	6.00	492.....	16.50	538.....	2.40
447.....	3.40	493.....	17.30	539.....	10.00
448.....	2.00	494.....	14.00	540.....	4.00
449.....	1.50	495.....	1.50	541.....	4.40
450.....	2.00	496.....	.00	542.....	1.00
451.....	1.00	497.....	5.00	543.....	4.40
452.....	2.50	498.....	5.40	544.....	2.40
453.....	4.50	499.....	5.40	545.....	5.75

No.		No.		No.	
546.	3.00	592.	1.00	638.	2.00
547.	8.50	593.	2.00	639.	3.10
548.	8.00	594.	8.50	640.	2.50
549.	24.00	595.	1.00	641.	1.50
550.	15.80	596.	13.00	642.	3.00
551.	12.90	597.	1.50	643.	.00
552.	3.90	598.	1.50	644.	.75
553.	59.05	599.	1.00	645.	7.00
554.	2.40	600.	4.00	646.	4.40
555.	4.50	601.	1.00	647.	33.60
556.	2.00	602.	1.00	648.	27.20
557.	2.40	603.	10.50	649.	1.00
558.	2.00	604.	3.00	650.	1.00
559.	1.00	605.	1.00	651.	1.00
560.	.00	606.	4.00	652.	2.00
561.	3.40	607.	65.00	653.	5.20
562.	7.40	608.	117.60	654.	57.60
563.	1.50	609.	221.60	655.	12.00
564.	17.60	610.	9.60	656.	2.00
565.	28.00	611.	4.00	657.	8.00
566.	3.00	612.	6.40	658.	7.20
567.	.50	613.	24.80	659.	1.50
568.	2.40	614.	4.00	660.	.00
569.	4.90	615.	13.60	661.	14.30
570.	1.00	616.	122.40	662.	60.10
571.	2.00	617.	35.50	663.	1.00
572.	16.00	618.	12.60	664.	16.00
573.	4.00	619.	1.50	665.	.50
574.	4.00	620.	10.00	666.	3.60
575.	2.50	621.	2.00	667.	12.50
576.	5.00	622.	.00	668.	2.50
577.	8.70	623.	3.90	669.	1.00
578.	3.25	624.	1.50	670.	4.50
579.	2.00	625.	5.40	671.	3.75
580.	4.00	626.	1.50	672.	1.50
581.	2.00	627.	4.00	673.	36.00
582.	1.00	628.	2.00	674.	12.00
583.	5.60	629.	1.50	675.	.00
584.	6.00	630.	4.00	676.	9.50
585.	65.60	631.	1.00	677.	2.50
586.	4.00	632.	5.00	678.	2.50
587.	1.50	633.	5.90	679.	3.00
588.	27.20	634.	3.00	680.	1.00
589.	2.40	635.	1.00	681.	4.00
590.	2.40	636.	5.00	682.	1.00
591.	.00	637.	3.00	683.	4.50

No.		No.		No.	
684.....	1.50	730.....	2.40	776.....	1.50
685.....	76.40	731.....	5.00	777.....	9.00
686.....	24.00	732.....	4.00	778.....	2.00
687.....	8.00	733.....	2.00	779.....	4.00
688.....	8.00	734.....	2.00	780.....	.75
689.....	.00	735.....	2.00	781.....	.75
690.....	27.20	736.....	5.20	782.....	2.00
691.....	.00	737.....	4.00	783.....	41.60
692.....	30.10	738.....	2.00	784.....	1.00
693.....	6.40	739.....	1.00	785.....	56.90
694.....	2.00	740.....	3.75	786.....	2.40
695.....	4.00	741.....	2.00	787.....	.00
696.....	4.50	742.....	.50	788.....	2.00
697.....	2.00	743.....	.50	789.....	40.30
698.....	2.00	744.....	65.60	790.....	2.40
699.....	2.00	745.....	135.20	791.....	1.00
700.....	4.00	746.....	5.60	792.....	8.00
701.....	8.50	747.....	26.10	793.....	6.50
702.....	2.25	748.....	9.30	794.....	2.00
703.....	3.00	749.....	2.00	795.....	10.50
704.....	1.00	750.....	2.00	796.....	3.50
705.....	5.60	751.....	5.00	797.....	5.40
706.....	2.00	752.....	.50	798.....	2.00
707.....	5.20	753.....	2.40	799.....	1.00
708.....	12.00	754.....	8.00	800.....	3.00
709.....	8.00	755.....	20.00	801.....	5.50
710.....	96.80	756.....	20.00	802.....	.00
711.....	121.60	757.....	9.60	803.....	1.25
712.....	54.40	758.....	1.00	804.....	7.20
713.....	8.00	759.....	1.50	805.....	13.60
714.....	1.50	760.....	2.50	806.....	3.20
715.....	2.40	761.....	2.00	807.....	6.00
716.....	2.00	762.....	9.60	808.....	4.00
717.....	.50	763.....	16.00	809.....	126.50
718.....	1.50	764.....	16.50	810.....	95.20
719.....	4.90	765.....	7.20	811.....	22.00
720.....	2.00	766.....	12.20	812.....	75.60
721.....	1.00	767.....	6.30	813.....	95.20
722.....	2.40	768.....	2.00	814.....	43.50
723.....	.50	769.....	3.50	815.....	16.00
724.....	15.90	770.....	4.00	816.....	45.60
725.....	65.00	771.....	2.00	817.....	8.00
726.....	50.00	772.....	1.50	818.....	24.00
727.....	3.50	773.....	1.00	819.....	42.20
728.....	2.00	774.....	1.00	820.....	10.20
729.....	4.40	775.....	6.00		

No.		No.		No.	
821.....	12.60	867.....	1.00	913.....	17.11
822.....	3.90	868.....	.70	914.....	21.80
823.....	24.00	869.....	.50	915.....	6.00
824.....	.50	870.....	30.40	916.....	2.00
825.....	2.50	871.....	22.80	917.....	2.40
826.....	2.50	872.....	8.00	918.....	4.50
827.....	18.00	873.....	1.00	919.....	2.00
828.....	2.40	874.....	2.00	920.....	5.50
829.....	23.20	875.....	2.00	921.....	1.40
830.....	2.40	876.....	6.40	922.....	6.90
831.....	2.00	877.....	62.00	923.....	6.90
832.....	2.00	878.....	.50	924.....	2.40
833.....	1.00	879.....	128.00	925.....	7.00
834.....	1.00	880.....	2.00	926.....	3.00
835.....	1.00	881.....	4.00	927.....	1.00
836.....	2.00	882.....	8.00	928.....	10.40
837.....	3.00	883.....	9.00	929.....	.00
838.....	3.00	884.....	1.00	930.....	2.40
839.....	4.00	885.....	4.40	931.....	2.40
840.....	3.50	886.....	1.00	932.....	1.00
841.....	4.00	887.....	.75	933.....	4.00
842.....	1.00	888.....	4.75	934.....	5.40
843.....	1.00	889.....	3.00	935.....	6.80
844.....	8.00	890.....	3.00	936.....	6.00
845.....	1.00	891.....	7.00	937.....	7.50
846.....	1.00	892.....	90.90	938.....	.00
847.....	4.00	893.....	3.20	939.....	2.00
848.....	1.00	894.....	62.00	940.....	4.90
849.....	4.00	895.....	43.20	941.....	3.40
850.....	4.00	896.....	1.00	942.....	3.00
851.....	1.00	897.....	13.20	943.....	2.00
852.....	4.50	898.....	69.60	944.....	1.00
853.....	5.00	899.....	4.00	945.....	2.40
854.....	1.00	900.....	1.50	946.....	1.00
855.....	1.00	901.....	1.00	947.....	2.40
856.....	2.00	902.....	35.00	948.....	1.00
857.....	2.00	903.....	23.85	949.....	.50
858.....	1.00	904.....	1.75	950.....	1.00
859.....	1.50	905.....	384.83	951.....	2.00
860.....	1.00	906.....	28.46	952.....	.50
861.....	.50	907.....	166.65	953.....	1.00
862.....	.75	908.....	50.00	954.....	6.25
863.....	2.00	909.....	4.58	955.....	3.50
864.....	.25	910.....	.00	956.....	.25
865.....	1.00	911.....	6.40	957.....	13.10
866.....	2.00	912.....	1.50	958.....	2.00

No.		No.		No.	
959. ....	6.40	972. ....	9.60	985. ....	166.65
960. ....	16.00	973. ....	1.00	986. ....	50.00
961. ....	108.80	974. ....	20.00	987. ....	50.00
962. ....	7.20	975. ....	20.00	988. ....	54.00
963. ....	8.00	976. ....	20.00	989. ....	166.65
964. ....	6.40	977. ....	20.00	990. ....	50.00
965. ....	.50	978. ....	20.00	991. ....	3.90
966. ....	136.80	979. ....	20.00	992. ....	4.00
967. ....	61.60	980. ....	20.00	993. ....	3.64
968. ....	80.00	981. ....	35.00	994. ....	152.71
969. ....	.00	982. ....	9.60	995. ....	5.00
970. ....	3.91	983. ....	8.00	Total Series	
971. ....	21.25	984. ....	.00	1903...	\$37,605.66

Brought forward total of 967 series of 1903 Warrants paid.... \$37,605.66

And No. 17, Series of 1897.....	\$4.68	
No. 26, Series 1897.....	1.35	
No. 319, Principal, \$21.23; Interest \$4.55. . .	25.78	
No. 526, Series of 1897.....	6.90	
No. 540, Series of 1897.....	7.87	
	<hr/>	46.58
And No. 494, Series of 1902.....	1.00	
No. 562, Series of 1902.....	3.20	
No. 678, Series of 1902.....	4.00	
No. 681, Series of 1902.....	4.00	
No. 701, Series of 1902.....	2.00	
No. 846, Series of 1902.....	2.40	
No. 851, Series of 1902.....	2.50	19.10

Grand Total Warrants Paid in 1903. .... 37,671.34

EDMUND McINTYRE,

*Treasurer.*

**REPORT OF SUPERINTENDENT OF GATES, NEBRASKA STATE FAIR, 1903,**  
Of admissions between 7 a. m. and 6 p. m., from September 5 to September 11, 1903.

	Rail-road Coupon	State Fair General	Total Paid Tickets	General Comp.	Check Passes	Stock Coupon	Press Tickets	Adv. Tickets	Press Special	Total Passes & Co'p	Total at Gates	Amphi- theater	Total Tickets
Monday.....	532	3,661	4,193	441	499	729	309	15	.....	1,991	6,184	1,303	7,487
Tuesday.....	5,842	11,150	16,992	834	833	925	383	65	.....	3,640	20,632	7,021	27,653
Wednesday.....	3,727	5,463	9,190	458	564	801	643	35	.....	2,501	11,691	.....	11,691
Thursday.....	4,901	12,386	17,287	919	1,229	1,017	1,500	71	.....	4,736	22,023	4,639	26,712
Friday.....	773	3,736	4,509	780	1,059	1,003	740	33	.....	3,620	8,129	2,934	11,063
Totals, 1903.....	15,775	36,396	52,171	3,432	4,184	4,480	4,175	217	.....	16,488	68,559	15,947	84,606
Totals, 1902.....	14,770	31,065	45,835	2,989	3,404	4,171	2,999	.....	12	13,576	59,411	10,889	70,300
Totals, 1901.....	11,582	24,139	35,721	2,357	2,113	3,950	2,816	.....	28	11,264	46,985	9,116	56,101
Totals, 1900.....	14,106	19,309	33,415	2,336	1,663	3,871	2,360	.....	58	10,288	43,703	8,001	51,718

E. M. SEARLE, Jr.,  
Superintendent of Gates.

PRESIDENT: The Secretary's Annual Report will next be in order.

### SECRETARY'S ANNUAL REPORT, 1903.

The Secretary submitted his annual report as follows:

*To the State Board of Agriculture*—SIRS:—In keeping with law and custom so requiring, I hereby submit my annual report for the year ending December 31st, 1903.

The total resources were:

Balance on hand from 1902.....	\$1,557.42
Current receipts for the year 1903.....	43,859.23
Total assets for 1903.....	45,416.65

From this deduct: paid for premiums, \$14,664.60; paid for other purposes, \$24,198.71. Total paid out, \$38,863.31, leaving a balance on hand, \$6,553.34.

In this connection may appropriately be mentioned, as part of the net earnings for the year 1903, the actual cost of permanent improvements made on the grounds, not a portion of the usual annual expenses, such as construction of new buildings, lumber and labor for same, and grading speed track, amounting to \$5,122.40. Total earnings, \$10,118.32.

The following epitomized presentations are headings under which these expenditures were made:

Miscellaneous expenditures.....	\$2,620 47
Hotel bill, members State Board, guests and managers.....	608.65
Borrowed money.....	500 00
Forage.....	14 65
Paid State Horticultural Society.....	500 00
Permanent expenditures on Fair Grounds, building, labor, etc....	9,098 24
Livery.....	21 50
Salaries.....	3,500 00
Freight, Telegraph and Express.....	160 90
Printing and Advertising.....	2,245 49
Medals.....	153.97
Postage.....	220.75
Attractions, Cresceus, Band and Hyppodrome.....	2,294 04
Judges, Experts, Superintendents, Clerks, etc.....	2,260 05

Herewith I present a complete itemized statement of all warrants drawn for the year, showing to whom paid, date, and for what purpose, and amount of each.

These have all been in the hands of the Auditing Committee, by it audited and found correct

### THE FAIR OF 1903.

The Nebraska State Fair for 1903, that great object lesson school in its line, all things considered, was without precedent in the history of her Fairs. With the exception of Wednesday, the weather was unobjectionable. Even that day could not be complained of in matter of attendance and gate receipts. Both quality and quantity of live stock exhibits were particularly observable, rendering it difficult for expert judges to satisfy themselves, in many instances, as to superiority in excellence.

This was in evidence, more especially perhaps, in cattle, that our growers are in the right line of perfection and profit in this line of our industries. The correct theory of our feeding from the highest standpoint of scientific procedure, has been forcibly presented to the whole world, by that single individual specimen shown at the World's Exposition at Chicago in December last, the work of our own experiment station at Lincoln. The premium steer, "Challenger," heads the World's list of fat steers and science of feeding; stands as the superior work of the Nebraska Agricultural College, and to the special credit of the men, Burnett and Smith, who accomplished it.

This is a practical object lesson, illustrating the purpose for which experiment stations were inaugurated. Shows the highway and by way of progress and development into which science leads agriculture and its kindred. There should no longer remain a doubt as to the value of an agricultural experiment station, or the men who have it in charge.

For information of those concerned, permit mention of the progress and development of educated agriculture in Nebraska. The school of agriculture started in 1896 with fifteen students; January 1st, 1904, there were 272.

While there are no ladies as students in the regular school of agriculture, there are a few in the agricultural and horticultural courses in the University. I repeat with increased emphasis that no state in the Union, at our age, has ever shown such advancement in the higher order of agriculture, the impress of which is plainly visible in all the works of its kindreds. This, too, may be truly said of all other branches of education in the State.

#### CROP REPORTS FOR 1903.

I need not again refer to the impossibility of providing, at date of this meeting, a detailed report of the crops for 1903. Only estimates can be had. I have availed myself of the best resources to this end obtainable. In fact, all crop statistics, outside shipping records, are but guesswork at best. Approximates only, can be obtained. From this standpoint, the following of the leading crops in Nebraska are presented:

	Acreage	Bu. per Acre	T'tl Yld, Bu.
Corn.....	6,124,113	32	188,460,400
Winter Wheat. ....	2,104,000	25	52,600,000
Spring Wheat.....	499,500	18	8,989,200
Oats .....	2,000,112	30	60,300,360
Rye. ....	345,258	20	6,904,150
Barley. ....	125,340	30	3,760,200
Alfalfa. ....	198,540	504,160 tons	
Timothy. ....	268,966	497,988 tons	
Clover. ....	58,565	110,321 tons	

It may be said of the crops in Nebraska for 1903, that, while not in all respects what the farmers desired, yet, upon the whole, and averaging the state, results have been remunerative and to satisfaction. Reports as to soft and unmerchantable corn by reason of late planting, are found exaggerated, and facts better than anticipated.



A crop note appended to the report of the Secretary of Hitchcock County, not called for in report blank, is worthy of attention and record: "Fifteen hundred acres of sugar beets raised in Hitchcock County in 1903, which means 22,500 tons; which means 11,250 wagonloads, 2 tons each; which means 1,125 carloads of 40,000 pounds each; which means one train load of thirty cars for thirty-eight days; which means \$100,000 cash to growers."

#### COUNTY AGRICULTURAL SOCIETIES.

As was predicted by friends when a law was enacted by the last Legislature, substantially taking from County Agricultural Societies in the state the aid extended them formerly, and now existing in near all other states, did its work most effectually.

I have taken the pains to ascertain, officially, how many counties now have organizations, and how many have none. Where we find such old working, reliable counties as Butler, Cass, Buffalo, Cumings, Dodge, Adams, Box Butte, Hall, Lincoln, Merrick, Nance, Otoe, Platte, Saline, Wayne, Webster and Washington, sixteen in all, have fallen out of line, and their former organization cease to exist, we may readily realize how much harm can be done the great agricultural factor of the state by hasty and ill advised legislation. Some of these counties simply keep up an organization, but hold no fair.

The writer is of the opinion that this matter can now be presented to the coming Legislature with such force as to secure the repeal of the act, passed under heavy protest of practical farmers, with an amendment compelling county authorities to aid county societies as heretofore, to a reasonable extent, and thus advance the cause of agriculture in Nebraska, which is the great and dominant factor of its industries.

Of the ninety counties in Nebraska, 42 have organizations, and 46 have none.

#### NEBRASKA—ITS AGRICULTURAL AND KINDRED ASSOCIATIONS.

Nebraska leads all other states in the Union with its agricultural and kindred Associations. There are to-day, the following active, working State Associations in session in this city and at the Agricultural Experiment Farm this week: The State Board of Agriculture; State Swine Breeders' Ass'n; Nebraska Improved Live Stock Breeders' Ass'n; Nebraska Dairyman's Ass'n; Nebraska Veterinary Medical Ass'n; Duroc-Jersey Breeders' Ass'n; Ass'n of Agricultural Students; Nebraska State Poultry Ass'n; Nebraska Shorthorn Breeders' Ass'n; Nebraska Corn Improvers Ass'n; Nebraska Bee Keepers' Ass'n; Nebraska Irrigation Ass'n; Nebraska Stock Growers' Ass'n; Nebraska Park and Forestry Ass'n; The Farmers' Co-Operative Grain and Live Stock Ass'n.

It is gratifying to note and report the general favorable status of agriculture in Nebraska. It is all of the most advanced order, in which the impress of the Nebraska College of Agriculture is strongly manifest.

#### FORESTRY IN NEBRASKA.

During my forty-nine years' residence and experimentation in Nebraska,

I have entertained a great interest in tree planting, clothing the hitherto treeless plains with trees. Witnessing the rapid and gigantic strides this developing agency has made within that time, only the more increases the interest, and induces me, with pride, to again refer to it in my annual report. This, especially, as this Board, I repeat, inaugurated planting trees on the waste places in this state—the Sand Hills. The present flattering status of tree planting from a commercial standpoint, is the outgrowth of that early day experiment.

Two years ago, in my annual report, I called attention to the fact that, while individual hands had accomplished marvelous results, the enterprise, to be treated from a commercial standpoint, required Government aid, which, in duty bound, it should give. Since that time, under the auspices of the general government, aid and work in Forestry, especially within the borders of our own state, has shown great accomplishments. Appropriation of lands hitherto worthless—our real sand hills—and money to defray expenses have been made, and the work is progressing most gratifying.

William L. Hall, a young, practical, and most enthusiastic student of Forestry, a graduate of the Kansas Agricultural College, now Chief of the Division of Forest Extension, Bureau of Forestry, has been, and is yet doing, with pen and voice, a wonderful work in the higher planes of Forestry.

It was the speaker's pleasure to spend ten days with this gentleman two years since, showing what individual efforts had accomplished in its crude and less informed ways, in earlier days, and older counties of Nebraska. He is now in charge of the Dismal River tree planting in the sand hills of Nebraska. From a recent publication of his on this subject, sent me, and as showing its future importance, I quote:

"Lying between the agricultural region and the mountains, the semiarid region embraces several sections of large extent, which, through the production of timber, would attain a value otherwise impossible. The most notable of these sections is that containing the sand hills, in West Central Nebraska. They cover an area of 100 by 150 acres, which, throughout is well adapted to the growth of pine timber. A large amount of land in the sand hills is yet retained by the Government. In April, 1902, the Niobrara and Dismal River reserves, containing, in all, 208,902 acres, were established in this section for the purpose of making a systematic trial of forestation."

A careful system of forest management, which involves planting on denuded water-sheds, is of fundamental importance to the effectiveness of large irrigation works.

This is a work far beyond the capacity of the individual, or even the state, and belongs inherently to the National Government.

President Roosevelt, in a recent address before the American Forestry Association, speaking of the importance of forestry, said:

"You must convince the people of the truth—and it is the truth—that the success of home-makers depends, in the long run, upon the wisdom with which the nation takes care of its forests. That seems a strong statement, but it is none too strong.

"You, yourselves, have got to keep this practical object before your mind:

to remember that a forest which contributes nothing to the wealth, progress or safety of a country, is of no interest to the Government, and should be of little interest to the forester.

"The forest problem is, in many ways, the most vital internal problem in the United States. The more closely this statement is examined, the more evident the truth becomes. In the arid region of the west, agriculture depends, first of all, upon the available water supply. In such a region, forest protection alone can maintain the stream flow necessary for irrigation, and can prevent the great and destructive floods so ruinous to communities farther down the same stream, that heads the arid regions."

In his message to the present Congress, now in session, he further adds to this important subject by saying: "The study of the opportunities for reclamation of the vast extent of arid land, shows that whether this reclamation is done by individuals, corporations, or the state, the sources of water supply must be effectively protected and the reservoirs guarded by the preservation of the forests at the head waters of the streams. The engineers making the preliminary examinations continually emphasize this need and urge that the remaining public lands at the head waters of the important streams of the west be reserved to insure permanency of water supply for irrigation. Much progress in forestry has been made during the past year. The necessity for perpetuating our forest resources whether in public or private hands, is recognized now as never before. The demand for forest reserves has been insistent in the west, because the west must use water, wood, and summer range which only such reserves can supply."

I could dwell indefinitely on this subject so important to our state and people, but time and occasion will not permit. Let this brief reference suffice as to what is going on in forestry in our own state.

#### EVENING STATE FAIR ENTERTAINMENTS, WITH OTHER THOUGHTS IN CONNECTION THEREWITH.

I have ever been of the opinion that evening entertainments at State Fairs are practical and can be made valuable factors in financial resources. Taken in connection with another matter to which I shall here call attention, I have, since our last Fair, in seeking new and advanced Fair features, given unusual and careful thought to these ends.

Without such entertainments, we naturally lose a large per cent of attendance from patrons in the city at which the Fair is held. Large contributions and extra efforts by citizens competing for location of Fairs, are not made for "fun or glory." They are made from a financial and personally interested standpoint, to obtain respective shares of money left in the city during Fair week by visitors attending. This sum has been approximately and fairly estimated at from \$250,000 to \$400,000 during each Fair. All business men, and others who expect a share of this public contribution, are naturally busy, during day hours, taking it in, and hence do not attend the Fair.

My information from states where night entertainments are in vogue, is they are a decided success. Ohio holds her best speed events at night. The

Secretary of the Minnesota State Fair writes me that, before the introduction of night entertainments were resorted to, their concession resources, each season, averaged about \$4,000. Since then, they have been over \$16,000 in a year. Gate receipts correspondingly increased.

This matter was under discussion at the late meeting of the American Association of Fairs and Expositions at its session at Chicago, in December last. President Dinsmore of this Board, was a delegate in attendance, and may, if this matter elicits discussion by this Board, furnish you with more detailed information.

These lines of thought in this matter leads me, in connection, to another matter I desire to present for your consideration. That is, the obligations existing between Fairs and their exhibitors; those who make Fairs. My convictions are, and have always been, that exhibitors should, where possible, be relieved from all entrance fees; all per cent deductions from winners; all charges for space; fees for stalls and pens. To illustrate relations between exhibitors and management. It is no trick to purchase and equip grounds. These may be of the very first order in all respects. With no exhibitors, there can be no Fair—no show to invite patrons to come and see—exhibitors make Fairs. Premiums awarded directly, at best, but feebly compensate the exhibitor, especially is this so as to county collective exhibitors. I have personally had much experience in this and know whereof I speak.

With these assertions, I realize I am confronted with the fact that all State Fairs of which I have knowledge, revenue is derived in some shape from their exhibitors. All, except Nebraska, charge each entry 10 per cent on all first premiums as an entrance fee. We charge 20 per cent deduction off all winners on sums over \$2.00. Thus we tax exhibitors less than any other state.

Every encouragement and accommodation should be extended exhibitors. To relieve them of all possible expense, will be to this end.

This would be a new and advanced departure that would touch a popular chord in Fair affairs; that would add immensely to our already popular and successful management. I am not slow to present these lines of thought for your consideration, because of their importance and my faith in them.

Our present sources of revenue will not, of course, permit this departure. I believe, however, they are practical, and if inaugurated, gigantic results would follow.

A word as to the finances, with us involved in this line, in the reform indicated. Our income from stalls and pens the last year, was unprecedentedly large, reaching \$1,161. Our 20 per cent discount from winners was \$2,021.00. Total sum, \$3,182.00. This, I have no hesitancy in expressing a belief, could be handsomely overcome by evening entertainments, judiciously managed.

I will not now and here undertake to discuss this matter further in detail. Believing it worthy of careful thought and consideration, it is presented you for what it may be thought worth.

## AMOUNTS CHARGED TO THE TREASURER FOR THE YEAR 1903.

Balance on hand .....	\$1,557.42
General Admission Tickets. ....	18,285.00
Amphitheater Tickets. ....	3,960.00
Camping tickets. ....	29.50
Quarter Stretch Tickets. ....	486.50
B. & M. Coupons. ....	7,736.00
B. & M. $\frac{1}{2}$ Coupons. ....	69.50
Foster, over-paid. ....	2.65
Drill Team .....	10.00
Concessions. ....	4,082.41
Speed. ....	2,577.40
Stalls and Pens .....	1,161.00
Borrowed Money. ....	500.00
State Appropriation .....	3,000.00
Lumber Sold .....	3.00
Grass Sold. ....	45.00
Rent portion F. G. ....	20.00
Speed Penalty .....	50.00
License .....	215.15
	<hr/>
	\$43,790.53
Interest on Loan, \$500. ....	8.50
Balance due on Warrant No. 1, \$250. ....	55.00
Paid for Silver Medals, (Lindsey) .....	5.20
	<hr/>
	\$43,859.23

*Robert W. Furnas, Secretary, in account with Nebraska State Board of Agriculture.*

## Dr.

State Appropriation .....	\$3,000.00
Concessions. ....	4,082.41
Speed. ....	2,577.40
Stalls and Pens .....	1,161.00
Borrowed Money. ....	491.50
Lumber Sold .....	3.00
Grass Sold. ....	45.00
Rent Ground .....	20.00
Speed Penalty .....	50.00
License .....	215.15
Interest on Loan, \$500. ....	8.50
Balance Due on Warrant No. 1, \$250. ....	55.00
Paid for Silver Medals, (Lindsey) .....	5.20
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	\$11,714.06

## Cr.

By Treasurer's Receipts. ....	\$11,714.06
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LIST OF WARRANTS ISSUED FOR THE BOARD YEAR 1903,  
SHOWING TO WHOM ISSUED, FOR WHAT PURPOSE, DATE  
AND AMOUNT OF EACH.

January	No.	Pre.	Misc.
21 E. McIntyre. ....	1 Pay Members St. Bd. ..		\$250.00
21 Leach & Plym. ....	2 Plans water closets. ....		10.00
30 W. H. Stowell. ....	3 Supplies. ....		28 25
30 Kearney Hub. ....	4 Printing. ....		10 00
31 G. W. Hervey. ....	5 Judge Class "D". ....		10 00
31 Robt. W. Furnas. ....	6 January Allowance. ....		50 00
31 Robt. W. Furnas. ....	7 January Salary. ....		166 65
February			
2 Nebr. Corn. Imp. ....	8 For Exhibit. ....		130 00
3 E. E. Cole. ....	9 Postage, Jan. ....		6 94
9 W. H. Scott. ....	10 Duplicate No. 776, 1902	\$2 40	
10 Jno. B. Lewis. ....	11 Ft. Tel. & Ex. ....		5 22
28 C. H. Rudge. ....	12 Carriage Hire. ....		11 50
28 State Journal. ....	13 Supplies. ....		7 05
28 J. E. Ferris. ....	14 Stenographer. ....		45 00
28 H. L. Cook. ....	15 Ex. Attending Conv. ..		12 55
March			
2 Robt. W. Furnas. ....	16 Salary, Feby. ....		166 65
2 Robt. W. Furnas. ....	17 Allowance, Feby. ....		50 00
2 Harry Schickadantz. ....	18 Pro rata, Howard Co. ....	29 20	
2 Wm. Clark. ....	19 Pro rata, Scotts Bluff ..	26.45	
2 D. D. Carpender. ....	20 Pro rata, Thomas Co. ....	22 15	
	21 Void. ....		
2 W. H. Stowell. ....	22 Postage. ....		58 70
5 J. M. Morrison. ....	23 Premium, 1902. ....	9.60	
5 Jno. B. Lewis. ....	24 Ft. Tel. & Ex. ....		3 15
5 E. E. Cole. ....	25 Postage, Feby. ....		8 59
13 S. D. Childs. ....	26 Medals. ....		1 26
21 C. H. Cronk. ....	27 Pro rata Frontier Co. ....	22 00	
26 Claud S. Wilson. ....	28 Service on Contract. ....		2 50
31 Robt. W. Furnas. ....	29 Salary, Mch. ....		166 65
31 Robt. W. Furnas. ....	30 Allowance, Mch. ....		50 00
April			
3 Jno. B. Lewis. ....	31 Ft. Tel. & Ex. ....		2 12
3 E. E. Cole. ....	32 Postage, Mch. ....		7 52
11 D. Givens & Sons. ....	33 Grading. ....		200 00
11 C. W. Chambers. ....	34 Prem. on Bonds. ....		27 50
11 State Journal. ....	35 Supplies. ....		2 75
11 C. H. Rudge. ....	36 Teleg. & Telep. ....		1 90
14 J. E. Ferris. ....	37 Typewriting. ....		2 50
15 W. H. Stowell. ....	38 Postage. ....		22 40
18 Youngers & Co. ....	39 Trees. ....		8 00
21 Western Supply Co. ....	40 Supplies. ....		8 00

May	No.	Pre.	Misc.
1 Robt. W. Furnas. ....	41	Salary, Apr. ....	166 65
1 Robt. W. Furnas. ....	42	Allowance, Apr. ....	50 00
	43	Void. ....	
1 E. E. Cole. ....	44	Postage, Apr. ....	10 16
4 Jno. B. Lewis. ....	45	Ft. Tel. & Ex. ....	11 24
9 D. Givens & Sons. ....	46	Grading. ....	674 02
12 World Pub. Co. ....	47	Advertising. ....	1 40
12 Bee Pub. Co. ....	48	Supplies. ....	1 00
13 Youngers & Co. ....	49	Trees. ....	3 75
13 Nebr. Speed Ass'n. ....	50	Membership and Adv. .	40 00
13 Chas. Scully. ....	51	Labor. ....	15 75
18 State Journal Co. ....	52	Adv. ....	1 00
18 C. H. Rudge. ....	53	Freight. ....	75
23 James Green. ....	54	Service Engineer. ....	75.00
June			
1 Robt. W. Furnas. ....	55	Salary, May. ....	166 65
1 Robt. W. Furnas. ....	56	Allowance, May. ....	50 00
18 Ed. Whitcomb. ....	57	Pstg. on 100 Pre. Lists	2 00
19 E. E. Cole. ....	58	Postage, May. ....	74
20 Jos. Tyler & Son. ....	59	Plans & Specifications. .	20 00
20 Jacob North & Co. ....	60	Printing. ....	25 75
26 Chas. Scully. ....	63	Salary to Mch. 1st. ....	75 00
26 Chas. Scully. ....	64	Labor pay roll. ....	34 41
July			
1 Robt. W. Furnas. ....	61	Salary, June. ....	166 65
1 Robt. W. Furnas. ....	62	Allowance, June. ....	50 00
2 E. E. Cole. ....	65	Postage, June. ....	29 02
2 State Journal Co. ....	66	Supplies. ....	1 25
2 E. McIntyre. ....	67	Discount on Note. ....	8 50
3 Jno. B. Lewis. ....	68	Ft., Tel. & Ex. ....	9 35
	69	Void. ....	
6 Spirit of the West. ....	70	Adv. ....	36.00
August			
1 Oval & Koster. ....	71	Supplies. ....	20 10
1 Robt. W. Furnas. ....	72	Salary, July. ....	166 65
1 Robt. W. Furnas. ....	73	Allowance, July. ....	50 00
1 E. E. Cole. ....	74	Postage, July. ....	10 77
	75	Void. ....	
11 Jno. B. Lewis. ....	76	Ft., Tel. & Ex. ....	19 38
21 C. H. Rudge. ....	77	Ex. & Tel. ....	30 75
21 C. H. Rudge. ....	78	Adv. ....	1 50
21 Geo. Campen. ....	79	Surveying. ....	10 00
21 Geo. B. Simpkins. ....	80	Postage and Express. .	7 35
	81	Void. ....	

August	No.	Pre.	Misc.
21 Amr. Trotting Ass'n.....	82 Annual Dues .....		75 00
	83 Void. ....		
21 Hayes Lytho. Co. ....	84 Hangers .....		320 00
	85 Void. ....		
21 W. H. Stowell. ....	86 Supplies .....		53 60
24 O. P. Harrison .....	87 Hog Barns.....		150 00
25 Andrew Wilson. ....	88 Labor pay roll. ....		28 35
28 E. E. Cole .....	89 Postage, Aug. ....		19 21
31 B. & M. R. R. Co. ....	90 Saw Dust.....		12 00
31 Andrew Wilson. ....	91 Pay Roll. ....		120 20
31 O. P. Harrison .....	92 On contract.....		100 00
September			
1 Robt. W. Furnas .....	93 Salary, Aug .....		166 65
1 Robt. W. Furnas .....	94 Allowance, Aug. ....		50 00
3 Jno. B. Lewis .....	95 Ft., Tel. & Ex. ....		16 95
5 A. Wilson.....	96 Pay Roll. ....		199 10
5 W. R. Mellor. ....	97 Bleacher fence. ....		12 00
6 Miss Z. Trester .....	98 Clerk, Sec. office ....		6 00
6 J. A. Kauffmann .....	99 Clerk, Sec. office ....		3 00
7 W. R. Mellor. ....	100 Redeeming tickets ....		30 00
7 G. T. Benjamin.....	101 Clerk Sec. office. ....		6 00
8 First Nat'l. Bank. ....	102 For note. ....		500 00
9 W. J. Kenedy. ....	103 Judge Class "B". ....		55 00
9 B. D. White. ....	104 Judge Class "I" .....		30 70
9 C. J. Tracy. ....	105 Police pay roll. ....		100 00
9 David Larson .....	106 Judge Class "E". ....		15 00
9 F. D. Heald. ....	107 Judge .....		3 00
9 Miss Z. Trester .....	108 Clerk Class "E" .....		3 00
10 E. McIntyre .....	109 Rebate R. R. fare. ....		10 60
10 H. J. Gildersleeve. ....	110 Fraternal Drill Ex. ....		23 25
10 Philip Miller .....	111 Third Prize Frat. Drill..		44 75
10 B. & M. R. R. Co. ....	112 Switching. ....		16 00
10 John P. Thomas. ....	113 Repairs. ....		8 00
10 John P. Thomas. ....	114 Repairs. ....		70 00
10 E. M. Searle .....	115 Pay Roll. ....		60 00
10 C. C. Bell.....	116 Sec. Prize Frat. Drill ..		67 25
10 Mary Lacty. ....	117 Sixth Prize Frat. Drill ..		15 00
10 L. R. Fletcher. ....	118 R. R. fare. ....		5 34
10 Geo. H. Ketcham. ....	119 Cresceus .....		1,000 00
10 W. S. Russell .....	120 Judge Class "E". ....		40 00
10 L. Morse.....	121 Supt. Class "F" .....		20 00
10 H. A. McComb.....	122 Judge Class "F". ....		12 00
10 S. W. Perrin .....	123 Judge Class "F". ....		12 00
11 E. H. Eggert. ....	124 Work Class "E". ....		5 00
11 E. H. Eggert. ....	125 Premiums. ....	60 45	
11 L. A. Kent.....	126 Clerk Class "F" .....		16 00



September	No.		Pre.	Misc.
11 E. McIntyre	127	Interest on Note.		8 50
11 E. McIntyre	128	Pay Roll.		235 00
11 E. McIntyre.	129	Check Hotel.		18.80
11 W. R. Mellor.	130	Ex. Rebate tickets.		19 00
11 W. E. Spicer.	131	Judge Class "C".		51 00
11 T. K. Tomson & Son.	132	Premiums.	88 00	
11 E. A. Burnett.	133	Judge Class "C".		9 00
11 C. F. Stone	134	Premiums.	72 50	
11 W. E. Sharp.	135	Fifth Prize Frat. Drill.		25 00
11 E. McIntyre	136	Rebate R. R. fare.		75
11 Harvey Johnson.	137	Rebate on pens.		6 00
11 W. H. Barger	138	Clerk and R. R. fare.		23 40
11 John Blair.	139	Asst. Class "C".		16 00
11 N. E. Leonard.	140	Asst. Class "C".		6 00
11 L. W. Leonard	141	Supt. Class "C".		48.85
11 J. Crouch & Son.	142	Premiums.	21 00	
11 A. Aikin.	143	Judge Class "O".		12 20
11 Frank Bennett	144	Judge Class "O".		8 75
11 W. E. Ewing.	145	Supt. Class "O".		24 85
11 R. Lunschen.	146	Premiums.	15 00	
11 E. M. Searle.	147	Pay Roll.		202 68
11 E. M. Searle.	148	Supt. Gates.		35 00
11 F. A. Baldwin.	149	Brown Co. Agr. Socy.		100 00
11 H. L. Cook	150	Supt. Class. "M".		61 40
11 Thos. Teal & Son.	151	Premiums.	62 00	
11 M. M. Stearns.	152	Premiums.	22 00	
11 W. C. Calley	153	Supt. L. N. & P.		29 55
11 E. Filley	154	Supt. Class "B".		41 00
11 E. L. Vance.	155	Supt. and R. R. fare.		28 25
11 Buck Bros.	156	Premiums.	92 10	
11 J. E. Bales & Son.	157	Premiums.	89 80	
11 Mrs. G. H. Devereux	158	Supt. Class "G".		26 65
11 Belle Keyser.	159	Asst. Class "G".		20 25
11 Minnie Ladd.	160	Asst. Class "G".		16 00
11 Robt. P. Starr.	161	Clerk to Board.		34 77
11 D. W. Evans.	162	Labor.		18 00
11 Wm. Foster.	163	Pay Roll.		209 20
11 W. B. Seeley.	164	Premiums.	70 00	
11 C. J. Tracy.	165	Pay Roll.		737 00
11 R. M. Wolcott.	166	Supt Class "D".		28 04
11 W. W. Cole.	167	Supt. Agr. Hall.		47 75
11 G. W. Lindsey.	168	Premium.	53 80	
11 Lewis Bros	169	Premium.	53 20	
11 W. N. Rogers	170	Premium.	74 30	
11 O. P. Updegraph	171	Starting Judge.		100 00
11 Wm. Wiles.	172	Speed Clerk		12 00

September	No.		Pre.	Misc.
11 Geo. F. Dickman	173	Speed Clerk		49 05
11 John Hedberg.	174	Speed Judge.		20 00
11 J. S. Pedler.	175	Speed Judge.		19.85
11 C. W. Bryan.	176	Speed Judge.		15 00
11 Ella Royce.	177	Clerk to Sec.		36 00
11 June Bassett.	178	Clerk to Sec.		36 00
11 M. Weiden.	179	Clerk to Sec.		24 00
11 Ed. Ewan.	180	Clerk to Sec.		25 50
11 N. S. Harlan.	181	Clerk to Sec.		36 00
11 C. L. Robinson.	182	Clerk to Sec.		36 00
11 Aaron Sullivan.	183	Messenger to Sec.		12 00
11 Robt. W. Furnas	184	Expenses during Fair.		14 65
11 Chas. Mann.	185	Supt. Forage		32 55
11 Mrs. J. C. Kier	186	Supt. Cake, etc		25 00
11 Mary Hohman	187	Asst. Cake, etc.		16 00
12 C. Horton.	188	Supt. Amphitheater.		20.67
12 S. C. Bassett.	189	Clerk to Sec.		48.00
12 C. M. Lewelling.	190	Supt. Class "E".		34 60
12 Jesse Lewis	191	Asst. Class "E"		17 50
12 H. Vanderbeck.	192	Sprinkler.		9 00
12 Hose Shields.	193	Hippodrome race		80 00
12 S. M. Mellick.	194	Livery.		10 00
12 John Roberts.	195	Asst. Supt. Gates		29 00
12 C. C. Wright.	196	Thomas Co. Exhibit.	50 00	
12 W. Colfax	197	Rock Co. Exhibit	50 00	
12 W. Clark	198	Scotts Bluff	60 00	
12 Wm. Foster.	199	Gen. Supt.		50 00
12 Nebr. Merc. Ins. Co.	200	Insurance.		44 00
12 R. C. Brownell	201	Speed Premium.	120 00	
12 J. S. Harrod.	202	Speed Premium.	50 00	
12 Murdock & Doolittle.	203	Speed Premium.	100 00	
8 W. H. Plourd	204	Speed Premium.	7 50	
8 J. Umstetter.	205	Speed Premium.	15.00	
9 Wm. Ferguson	206	Speed Premium.	20 00	
9 W. Snyder.	207	Speed Premium.	60 00	
9 C. D. Bell.	208	Speed Premium.	135 00	
9 H. E. Weidmeier	209	Speed Premium.	225.00	
9 C. S. Rex.	210	Speed Premium.	15 00	
10 C. O. Fall	211	Speed Premium.	25 00	
10 Axley & Shire.	212	Speed Premium.	100 00	
10 H. E. Weidmeier	213	Speed Premium.	30 00	
10 C. B. Michael	214	Speed Premium.	25 00	
10 L. P. Southworth.	215	Speed Premium.	200 00	
11 O. Robertson.	216	Speed Premium.	50 00	
11 Gus. Hart.	217	Speed Premium.	100 00	
11 R. L. Newton.	218	Speed Premium.	15 00	

September	No.		Pre.	Misc.
11 Lamb & Aukney	219	Speed Premium.	450 00	
11 C. H. Aldrich	220	Speed Premium.	66 00	
11 C. H. Aldrich	221	Speed Premium.	34 00	
11 Powell & Imrie	222	Speed Premium.	225 00	
11 W. Nowotney	223	Speed Premium.	271 25	
11 W. Nowotney	224	Speed Premium.	5 00	
11 J. T. Wright	225	Speed Premium.	60 00	
11 J. Umenstatter	226	Speed Premium.	55 00	
11 J. H. Sheen	227	Speed Premium.	30 00	
11 Frank Strahan	228	Speed Premium.	320 00	
11 C. H. Aldrich	229	Speed Premium.	100 00	
11 R. C. Brownell	230	Speed Premium.	195 00	
11 R. C. Brownell	231	Speed Premium.	30 00	
11 Fred Robare	232	Speed Premium.	540 00	
11 H. Pickrel	233	Speed Premium.	55 00	
11 H. D. Bennett	234	Speed Premium.	50 00	
11 Lamb & Aukney	235	Speed Premium.	60 00	
11 W. H. Plourd	236	Speed Premium.	87 50	
11 W. H. Plourd	237	Speed Premium.	11 25	
11 J. T. Shisher	238	Speed Premium.	90 00	
11 J. T. Shisher	239	Speed Premium.	10 00	
11 P. B. Haight	240	Speed Premium.	600 00	
11 W. T. Brown	241	Speed Premium.	50 00	
11 A. L. Peppers	242	Speed Premium.	30 00	
11 A. L. Peppers	243	Speed Premium.	30 00	
11 J. H. Sheen	244	Speed Premium.	120 00	
11 W. F. Walters	245	Speed Premium.	3 75	
11 W. F. Walters	246	Speed Premium.	15 00	
11 Tom Flaherty	247	Speed Premium.	18 75	
	248	Void.		
11 F. J. Tufts	249	Speed Premium.	46 00	
11 F. J. Tufts	250	Speed Premium.	9 00	
	251	Void.		
11 R. W. Lowery	252	Speed Premium.	210 00	
11 R. W. Lowery	253	Speed Premium.	15 00	
11 R. J. Flick	254	Speed Premium.	30 00	
15 W. H. Knight	255	Speed Collections.		163 90
15 Andrew Wilson	256	Labor		17 50
15 Jacob North & Co	257	Ptr. and Supplies		110 85
15 Jacob North & Co	258	Ptr. and Supplies		210 75
15 Jacob North & Co	259	$\frac{1}{4}$ Stretch Tickets		2 85
15 Wm. Earnst	260	Judge Class "A"		25 00
15 Chas. Fordyce	261	Supt. Class "J"		20 00
15 E. Whitcomb	262	Supt. Class "K"		25 00
15 Mrs. E. Whitcomb	263	Judge Cake, etc.		6 00
15 Western Supply Co	264	Plumbing Supplies		16 42

September	No.	Pre.	Misc.
15 W. R. Jackson. ....	265	Judge Educ. Exhibit. . .	6 00
15 C. H. Green. ....	266	Disinfecting pens. ....	7 50
15 C. W. Melick. ....	267	Asst. Supt. Class "J" . .	16 00
16 A. L. Haecker. ....	268	Supt. Class "I". ....	25 00
16 G. W. Davis. ....	269	Spraying Speed Barns .	21 25
16 Dr. A. T. Peters. ....	270	Veterinarian. ....	25 00
16 W. J. Kennedy. ....	271	Judge Class "A". ....	15 00
16 F. E. Stumpe. ....	272	4th Prize Frat. Drill . .	35 00
16 Miller & Paine. ....	273	Improvements. ....	35 94
16 Searle & Chappin. ....	274	Lumber. ....	120 00
16 Acme Sign Works. ....	275	Signs. ....	6 00
16 Acme Sign Works. ....	276	Figures. ....	2 50
16 Folsom Bros. ....	277	Insurance. ....	157 50
16 Nebr. Paper Bag Co. ....	278	Toilet Paper. ....	4 00
16 Burt Richards. ....	279	Insurance. ....	146 25
16 O. W. Palm. ....	280	Insurance. ....	41 62
16 Nichols Roofing Co. ....	281	Repairs. ....	87 50
16 R. S. Young. ....	282	Repairs, Grounds . . .	8 50
18 Miller & Paine. ....	283	Mdse. ....	14 00
16 Clark McDonald. ....	284	Insurance. ....	146 25
16 Dr. Gain. ....	285	Judging Horses. ....	10 00
16 Harry Porter. ....	286	Supplies. ....	2 25
16 Carsten Truelson. ....	287	Judging Class "O". . .	10 25
16 Cyril McKee. ....	288	Asst. Supt. "B". ....	1 50
16 Odell Bros. ....	289	Signs. ....	7 00
16 Spirit of the West. ....	290	Adv. ....	36 00
16 Rees Ptr. Co. ....	291	Tickets. ....	21 75
16 Nebraska Independent . .	292	Adv. ....	35 00
16 W. H. Stowell. ....	293	Printing. ....	118 90
16 O. P. Harrison. ....	294	Bal. New Hog Barns. . .	692 80
16 L. D. Stilson. ....	295	Judge Class "K". ....	3 00
16 Kostka Glass Co. ....	296	Glass. ....	18 70
16 Horse Review Co. ....	297	Adv. ....	70 00
16 G. W. Sanders. ....	298	Labor. ....	8 00
16 J. M. Jester. ....	299	Labor. ....	10 00
16 F. M. Wiggins. ....	300	Labor. ....	8 00
12 J. B. Dinsmore. ....	301	Salary. ....	300 00
12 C. H. Rudge. ....	302	Salary Bd. of Mgrs. . .	200 00
12 E. McIntyre. ....	303	Salary. Treasurer. ....	200 00
12 T. A. McKay. ....	304	Salary. ....	200 00
12 Peter Youngers. ....	305	Salary. ....	200 00
12 W. R. Mellor. ....	306	Salary. ....	200 00
12 J. O. Vincent. ....	307	Asst. Class "A". ....	24 25
12 G. W. Grenaeyer. ....	308	Feed. ....	14 65
12 W. L. Campbell. ....	309	Bleachers. ....	63 16
12 Aug. Hagenaw. ....	310	Music. ....	450 00

September	No.	Pre.	Misc.
12 Geo. H. Ketcham. ....	311	Cresceus .....	764 06
12 Geo. B. Simpkins. ....	312	Asst. Merc. Hall. ....	16 00
12 O. M. Druse. ....	313	Supt. Transportation. .	75 00
12 Western Newspaper. Un. .	314	Adv. ....	40 00
12 Omaha Daily Bee. ....	315	Adv. ....	35 00
12 World-Herald. ....	316	Adv. ....	50 00
12 Omaha Bee. ....	317	Adv. ....	50 00
12 20th Century Farmer. ....	318	Adv. ....	35 00
12 Nebraska Farmer. ....	319	Adv. ....	35 00
12 Lincoln Star. ....	320	Adv. ....	100 00
12 Nebr. State Journal. ....	321	Adv. ....	150 00
12 H. M. Bushnell. ....	322	Writing Ads. ....	50 00
12 R. J. Flick. ....	323	Supt. Speed. ....	71.75
12 H. M. Bushnell. ....	324	Stamps. ....	2 62
12 Searle & Chappin. ....	325	Lumber. ....	562 56
12 Robt. W. Furnas. ....	326	Mov. office from F. G. .	1 50
12 David Hanna. ....	327	Supt. Class "A". ....	40 00
12 Art C. Herrick. ....	328	First Prize Frat Drill. .	89 75
12 H. M. Shaeffer. ....	329	Asst. Secy. ....	70 00
12 John Wright. ....	330	Stenographer. ....	42 00
12 G. R. Williams. ....	331	Salary. ....	200 00
12 W. H. Green. ....	332	Wall Paper. ....	6.90
12 C. J. Tracy. ....	333	Pay Roll. ....	95.51
12 Chas. Scully. ....	334	Labor and Salary. ....	155.77
12 Chas. Scully. ....	335	Board Horses. ....	3.00
12 Chas. Scully. ....	336	Flagman. ....	20.00
12 Void. ....	337	Void. ....	
12 J. T. Codman. ....	338	Labor. ....	16.00
12 H. M. Brock. ....	339	Judge Class "H". ....	10.50
12 Louis Munday. ....	340	Asst. Judge Class "H". .	14.00
12 A. Woolworth. ....	341	Labor. ....	25.00
12 Void. ....	342	Void. ....	
12 Lindell Hotel. ....	343	Board. ....	327.35
12 W. J. O'Brien. ....	344	Fish Exhibit. ....	250.00
12 Mrs. F. M. Hall. ....	345	Supt. Class "H". ....	41.25
12 W. F. Johnson. ....	346	Clerk to Pres. ....	29.43
12 Rudge & Guenzel Co. ....	347	Mdse. ....	103.38
12 Peter Youngers. ....	348	State Hort. Approp. ....	500.00
12 Capitol City Ice Co. ....	349	Ice. ....	138.90
12 C. H. Rudge. ....	350	Expenses. ....	8.75
12 Lancaster Co. Agr. Ass'n. .	351	Bal. on Bldg. ....	200.00
12 Geo. A. Wilson. ....	352	Sheep Barns. ....	1,298.00
12 J. B. Dinsmore. ....	353	Secret Service Men. ....	60.00
12 J. B. Dinsmore. ....	354	Telephone. ....	4.45
12 J. B. Dinsmore. ....	355	Ex. Des Moines. ....	19.85
12 W. D. Matteson. ....	356	Messenger. ....	7.00

September	No.	Pre.	Misc.
12 A. G. Wilson. ....	357	Pay Roll. ....	255.45
12 Mrs. L. Doyle. ....	358	Improvements. ....	26.51
12 H. C. M. Burgess. ....	359	Ben Hur. ....	10.00
12 Lincoln Fire Dept. ....	360	Service. ....	36.75
12 Jas. Tyler. ....	361	Water Laborers. ....	32.00
12 C. E. Hayne. ....	362	Tickets Redeemed. ....	9.90
12 Chas. Kunkler. ....	363	Improvements. ....	8.00
12 G. B. Simpkins. ....	364	Refund Labor. ....	1.50
12 E. McIntyre. ....	365	Hotel Bill. ....	12.50
12 Lincoln Tent & A. Co. ....	366	Tents Rent. ....	215.50
12 Void. ....	367	Void. ....	
12 Lincoln Auditorium. ....	368	Settees. ....	23.75
12 A. R. Corruth. ....	369	Judge Class "E" ....	6.00
12 Geo. B. Simpkins. ....	370	Adv. ....	2.82
12 G. H. Walker. ....	371	Clerk to Simpkins. ....	24.00
16 J. J. Eddy. ....	372	Labor. ....	11.00
16 D. Jackson. ....	373	Labor. ....	8.00
16 W. E. Nash. ....	374	Labor. ....	9.00
16 F. T. Turner. ....	375	Labor. ....	10.09
16 G. W. Elmer. ....	376	Labor. ....	4.00
16 H. Meyers. ....	377	Labor. ....	10.50
16 Wm. James. ....	378	Co. Col. Ex. ....	240.00
16 Z. T. Leftwich. ....	379	Co. Col. Ex. ....	115.40
16 Jno. Ballard. ....	380	Co. Col. Ex. ....	112.40
16 O. P. Devol. ....	381	Co. Col. Ex. ....	108.60
16 L. R. Fletcher. ....	382	Co. Col. Ex. ....	106.60
17 C. A. Ready. ....	383	Co. Col. Ex. ....	99.80
17 W. W. Cole. ....	384	Co. Col. Ex. ....	98.20
17 Dole & Son. ....	385	Co. Col. Ex. ....	93.40
17 W. Clark. ....	386	C. Col. Ex. ....	32.00
17 M. Robbins. ....	387	Co. Col. Ex. ....	91.80
17 C. H. Cronk. ....	388	Co. Col. Ex. ....	80.00
17 Void. ....	389	Void. ....	
17 W. C. F. Lumley. ....	390	Co. Col. Ex. ....	80.00
17 W. Colfax. ....	391	Co. Col. Ex. ....	30.00
17 Void. ....	392	Void. ....	
17 L. A. Kent. ....	393	Co. Col. Ex. ....	80.00
17 C. C. Wright. ....	394	Co. Col. Ex. ....	30.00
17 B. Travis. ....	395	Co. Col. Ex. ....	80.00
17 W. Z. Taylor. ....	396	Co. Col. Ex. ....	80.00
25 J. E. Kirk. ....	397	Allowance at Fair paid Labor Union. ....	250.00
25 R. J. Flick. ....	398	Incidentals. ....	10.00
25 Lincoln Water Dept. ....	399	Repairs. ....	29.10
25 G. W. Hervey. ....	400	Judigng Sheep. ....	10.00
25 Lincoln Tank Co. ....	901	Oil. ....	1.00

September	No.		Pre.	Misc.
25 City Garbage Co. ....	902	Cleaning up Fair Grd. .		35.00
25 State Journal Co. ....	903	Supplies. ....		23.85
25 C. W. Tracy. ....	904	Printing. ....		1.75
25 Geo. B. Simpkins. ....	905	Per cent Concessions. .		384.83
25 Jacob North & Co. ....	906	Balance Account. ....		28.46
30 Robt. W. Furnas. ....	907	Salary, September. ....		166.65
30 Robt. W. Furnas. ....	908	Allowance. September .		50.00
October				
2 E. E. Cole. ....	909	Postage. ....		4.58
2 W. F. Hammond. ....	910	Premium. ....	9.60	
2 P. & C. Dawson. ....	911	Premium. ....	6.40	
2 Lincoln Transfer Co. ....	912	Drayage. ....		1.50
2 Jno. B. Lewis. ....	913	Ft. Tel. and Ex. ....		17.11
7 W. U. Tel. Co. ....	914	Telegraph. ....		21.80
8 Miss Kate Phelps. ....	915	Premium. ....	6.00	
8 Mrs. E. H. Hill. ....	916	Premium. ....	2.00	
8 Joe. Witmer. ....	907	Premium. ....	2.40	
9 Robt. Taylor. ....	918	In lieu of medals. ....	4.50	
9 Mae A. McKenzie. ....	919	Premium. ....	2.00	
10 Fitzgerald Co. ....	970	Supplies. ....		3.91
14 W. H. Stowell. ....	971	Stamped Envelopes. ....		21.25
15 Bowman & Fitch. ....	972	Premium. ....		9.60
19 M. A. Munsell. ....	973	Premium. ....	1.00	
19 C. H. Cronk. ....	974	Co. Col. Ex. ....	20.00	
19 W. C. F. Lumley. ....	975	Co. Col. Ex. ....	20.00	
19 W. Colfax. ....	976	Co. Col. Ex. ....	20.00	
19 W. Z. Taylor. ....	977	Co. Col. Ex. ....	20.00	
19 L. A. Kent. ....	978	Co. Col. Ex. ....	20.00	
19 C. C. Wright. ....	979	Co. Col. ES. ....	20.00	
19 B. Travis. ....	980	Co. Col. Ex. ....	20.00	
19 O. P. Hendershot. ....	981	Premium. ....	35.00	
19 W. T. Hammond. ....	982	Premium. ....	9.60	
19 Floyd Lyon. ....	983	Premium. ....	8.00	
19 Void. ....	984	Void. ....		
31 Robt. W. Furnas. ....	985	Salary, October. ....		166.65
31 Robt. W. Furnas. ....	986	Allowance, October. ....		50.00
November				
7 W. J. O'Brien. ....	987	Fish Exhibit. ....		50.00
7 Western Horseman. ....	988	Advertising. ....		54.00
December				
1 Robt. W. Furnas. ....	989	Salary, November. ....		166.65
1 Robt. W. Furnas. ....	990	Allowance, November. .		50.00
2 E. E. Cole. ....	991	Postage, Oct. ....		3.90
2 E. E. Cole. ....	992	Postage, Nov. ....		4.00
2 Jno. B. Lewis. ....	992	Ft. Tel. & Ex. ....		3.64
15 S. D. Childs & Co. ....	994	Medals. ....		152.71

December	No.	Pre.	Mist.
17 Nat. Live Stock Ass'n.....	995 Annual Dues.....		5.00
31 Robt. W. Furnas.....	996 Salary, December.....		166.65
31 Robt. W. Furnas.....	997 Allowance, December..		50.00
31 E. E. Cole.....	998 Postage, Dec., 1903....		14.13
31 Jno. B. Lewis.....	999 Ft. Tel. & Ex.....		1.30
Total .....	\$14,663.56	\$22,942.20	

## CROP REPORTS, 1903.

The following tables, crop returns for the year 1903, are official, taken from records in Auditor of State's office.

## NUMBER OF ACRES CULTIVATED.

COUNTIES	WHEAT	CORN	OATS	BARLEY	RYE	MILLET	ALFALFA
Adams.....	77,275	58,929	4,013	367	521	709	886
Antelope.....	16,649	85,749	64,460	859	3,881	2,252	2,269
Banner.....	2,506	3,236	1,459	101	730	981	459
Blaine.....	74	4,827	867		596	342	109
Boone.....	24,727	99,980	48,976	806	3,442	1,991	2,457
Box Butte.....	1,596	5,008	1,783	826	1,996	2,538	492
Boyd.....	10,603	40,708	14,845	927	1,376	2,567	358
Brown.....	6,758	27,836	8,352	449	1,965	2,370	422
Buffalo.....	59,813	119,601	38,924	771	14,349	2,719	15,126
Burt.....	17,221	92,558	32,552	2,354	1,183	1,307	1,799
Butler.....	50,633	125,028	53,562	365	2,473	311	1,329
Cass.....	19,416	153,982	32,420	46	970	603	709
Cedar.....	11,276	108,974	57,265	10,626	629	1,593	1,240
Chase.....	6,036	25,781	570	300	1,305	2,974	374
Cherry.....	4,242	19,229	3,070	84	295	1,596	1,880
Cheyenne.....							
Clay.....	97,789	99,643	25,184	578	2,159	1,459	4,828
Colfax.....	18,386	82,765	3,143	2,125	3,155	979	776
Cuming.....	33,977	108,464	50,593	2,220	1,036	3,449	1,135
Custer.....	47,195	224,752	41,175	7,407	34,170	10,508	7,339
Dakota.....	14,911	43,550	9,232	897	124	2,304	229
Dawes.....	5,855	14,885	2,483	2,819	9,627	1,939	2,640
Dawson.....	60,473	95,687	17,761	2,618	28,131	1,592	22,907
Deuel.....	1,980	8,506	462	979	4,249	1,009	1,277
Dixon.....	16,527	88,191	35,954	3,540	231	3,058	808
Dodge.....	19,182	108,154	42,726	810	838	2,237	803
Douglas.....	2,032	75,185	18,696	504	511	2,739	850
Dundy.....	2,940	28,431	193	845	477	744	1,066
Fillmore.....	77,022	122,005	39,201	85	1,113	559	3,453
Franklin.....	50,803	70,036	11,798	67	1,671	771	8,458
Frontier.....	62,451	87,659	4,289	674	21,073	1,970	1,359
Furnas.....	86,305	70,948	2,248	1,208	11,047	727	15,861
Gage.....	67,469	202,134	53,790	32	840	3,146	3,094
Garfield.....	1,338	9,495	2,727	195	807	232	233
Gosper.....	46,384	51,292	3,906	152	9,375	996	1,598
Grant.....		14	15			2	574
Greene.....	11,770	60,250	20,724	408	3,467	2,073	1,570
Hall.....	34,381	78,864	36,335	487	7,204	772	12,780
Hamilton.....	86,956	104,615	33,050	1,504	1,254	212	1,227
Harlan.....	69,332	71,302	5,747	1,159	8,666	1,148	10,134
Hayes.....	4,296	59,932	280	417	3,115	1,316	509
Hitchcock.....	23,828	23,880	170	7,853	5,901	662	784
Holt.....	5,759	87,183	32,407	649	13,187	2,331	1,184
Hooker.....		817			6	125	5
Howard.....	27,226	74,747	20,134	531	10,825	1,734	1,698
Jefferson.....	38,285	97,805	119,799	29	559	2,209	2,358
Johnson.....	25,542	72,687	18,815	123	205	1,500	1,352
Kearney.....	79,840	79,803	20,058	152	1,317	1,437	4,740
Keith.....	2,193	7,737	403	533	637	1,051	1,991
Keya Paha.....	5,057	24,053	6,541	501	903	2,800	275



## CROP REPORT, 1903—Continued.

## NUMBER OF ACRES CULTIVATED.

COUNTIES	WHEAT	CORN	OATS	BARLEY	RYE	MILLET	ALFALFA
Kimball.....	904	610	94	45	320	226	963
Knox.....	14,086	88,897	49,058	9,121	2,054	3,943	683
Lancaster.....	28,563	164,979	44,846	44	699	2,117	1,997
Lincoln.....	13,879	52,408	3,047	2,986	14,897	1,359	1,446
Logan.....	1,810	10,074	617	2,513	1,978	131	44
Loup.....	4,058	7,687	2,319	49	574	140	242
Madison.....	18,564	99,023	65,710	2,810	3,629	3,349	972
McPherson.....							
Merrick.....	7,490	65,027	21,192	227	7,556	556	4,638
Nance.....	16,624	89,859	15,996	487	3,824	3,209	2,643
Nemaha.....	25,461	72,671	14,043	14	267	499	1,649
Nuckolls.....	48,621	106,331	14,191	16	2,149	2,667	8,579
Otoe.....	34,613	143,580	44,986	71	718	1,379	642
Pawnee.....	16,036	91,208	19,748	6	142	2,386	905
Perkins.....	3,927	12,977	155	186	792	1,133	
Phelps.....	85,584	757,14	14,991	278	7,501	699	4,435
Pierce.....	13,379	79,155	49,536	8,595	3,431	1,073	371
Platte.....	37,247	122,453	67,784	5,326	7,663	3,228	4,234
Polk.....	35,337	72,804	29,560	453	2,103	220	6,267
Red Willow.....	67,420	55,775	722	1,507	15,701	733	7,795
Richardson.....	25,813	99,938	22,608	199	1,382	606	3,155
Rock.....	616	14,236	3,592	154	958	445	387
Saline.....	60,535	119,452	40,054	97	1,331	1,687	1,885
Sarpy.....	1,675	54,394	17,327	62	459	1,171	915
Saunders.....	21,577	174,422	56,655	111	3,819	891	798
Scott's Bluff.....	1,807	3,214	2,240		69	50	7,217
Seward.....	49,594	120,383	43,558	183	1,025	763	1,350
Sheridan.....	14,115	13,132	721	120	6,648	1,911	1,665
Sherman.....	24,436	67,471	15,749	373	10,294	2,407	2,596
Sioux.....	1,312	2,264	941	273	1,003	221	541
Stanton.....	12,166	80,157	36,700	2,637	2,962	1,941	1,799
Thayer.....	46,277	114,719	30,156	56	1,987	1,278	4,530
Thomas.....		2,506	1		110	130	
Thurston.....	10,878	56,167	15,943	2,853	109	1,422	46
Valley.....	20,457	78,992	20,695	1,057	6,694	2,699	6,338
Washington.....	21,561	17,859	40,003	838	1,007	1,930	2,093
Wayne.....	20,432	103,166	47,234	7,872	839	3,325	422
Webster.....	46,943	81,177	13,301	42	1,871	1,585	9,387
Wheeler.....	2,488	12,693	6,161	144	1,717	428	971
York.....	81,413	123,899	41,533	930	1,729	356	4,291
Total.....	2,379,378	5,984,048	1,958,721	113,717	343,067	137,245	238,401

The total acreage of other crops in the state are as follows:

Sugar beets.....	11,160
Timothy.....	238,641
Sorghum cane.....	128,598
Irish potatoes.....	69,102
Broom corn.....	2,373
Clover.....	54,635
Blue grass.....	172,881
Other tame grass.....	298,515
Timber.....	311,215

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# Official Tabulated Reports.

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## OFFICIAL TABULATED REPORTS, 1903

COUNTIES	HORSES			CATTLE			MULES AND ASSES		
	NUMBER	VALUE	AV.	NUMBER	VALUE	AV.	NUMBER	VALUE	AV.
Adams.....	8,576	\$55,858	\$6.51	17,539	\$64,593	\$3.68	596	\$4,203	\$7.05
Antelope.....	9,242	61,276	6.63	40,004	181,417	4.53	371	3,058	8.24
Banner.....	2,591	17,512	6.72	14,745	77,787	5.41	33	3,372	8.24
Blaine.....	1,036	5,713	5.06	8,289	26,329	3.17	32	251	8.00
Boone.....	9,056	74,600	8.23	32,415	155,137	4.78	602	4,902	8.13
Box Butte.....	4,268	29,290	6.85	26,376	110,641	4.20	21	189	9.00
Boyd.....	7,423	55,582	7.48	18,133	89,936	4.90	240	1,908	7.95
Brown.....	4,267	49,953	11.71	17,831	100,730	5.65	106	1,787	16.86
Buffalo.....	12,996	68,175	5.25	42,170	131,567	3.15	657	3,731	5.68
Burt.....	8,438	96,192	11.40	29,002	150,503	5.18	736	9,244	2.56
Butler.....	9,151	64,600	7.00	25,464	66,346	2.60	657	5,029	7.65
Cass.....	9,317	112,218	11.93	23,026	104,999	4.56	67	16,827	14.36
Cedar.....	10,919	116,752	10.69	44,654	166,643	3.73	562	6,395	11.37
Chase.....	3,550	24,634	6.94	17,051	89,608	5.25	341	1,872	5.48
Cherry.....	17,368	130,409	7.50	128,659	769,977	5.98	380	4,483	11.80
Cheyenne.....	8,718	55,209	6.33	44,102	195,941	4.45	784	6,546	8.34
Clay.....	10,363	79,010	7.62	19,218	82,883	4.31	244	2,403	9.64
Colfax.....	6,393	63,106	9.87	21,418	86,265	4.02	514	3,788	7.36
Cuming.....	8,314	50,781	6.00	36,097	146,644	4.06	703	3,926	5.79
Custer.....	25,499	119,819	4.22	92,723	350,636	3.79	248	2,931	2.22
Dakota.....	4,106	43,276	10.53	14,178	79,982	5.64	58	338	5.84
Dawes.....	6,077	33,282	5.47	28,544	139,182	4.88	291	1,614	5.55
Dawson.....	10,996	52,562	4.78	37,947	94,860	2.50	118	281	2.38
Deuel.....	5,919	14,040	2.37	53,922	110,737	2.00	328	3,069	9.35
Dixon.....	6,793	58,337	8.58	25,315	124,410	4.91	396	4,083	10.31
Dodge.....	8,615	86,796	10.07	27,976	112,636	4.02	600	6,129	10.21
Douglas.....	10,295	114,462	11.12	16,358	89,635	5.48	296	1,645	5.55
Dundy.....	3,091	15,786	5.10	18,166	72,643	3.97	691	4,391	6.35
Fillmore.....	9,792	58,061	5.92	19,294	67,754	3.50	653	5,096	7.19
Franklin.....	7,169	50,621	7.06	24,847	109,226	4.39	404	3,900	9.65
Frontier.....	8,083	67,339	8.33	21,128	94,946	4.49	529	4,499	8.50
Furnas.....	9,141	70,523	7.71	25,127	96,047	3.81	1,585	15,085	9.52
Gage.....	13,489	112,311	8.32	30,947	127,351	4.11	32	304	9.50
Garfield.....	2,293	14,927	6.51	9,740	52,866	5.43	219	1,875	8.56
Gosper.....	5,000	35,487	7.07	16,889	57,112	3.44	25	191	7.64
Grant.....	2,240	20,300	9.06	32,079	214,326	6.68	231	1,886	7.12
Greeley.....	5,470	45,534	8.32	21,202	84,220	3.97	610	4,346	7.12
Hall.....	7,907	49,935	6.31	30,559	107,773	3.52	510	5,334	10.45
Hamilton.....	9,638	88,104	9.14	26,558	98,393	3.70	578	3,914	6.95
Harlan.....	7,614	38,675	5.08	20,832	88,347	4.23	205	1,280	6.24
Hayes.....	3,550	18,702	5.26	13,498	54,028	4.00	184	1,260	9.90
Hitchcock.....	4,312	31,961	7.41	12,861	63,449	4.93	441	1,822	3.60
Holt.....	12,283	42,489	3.45	69,594	208,268	2.99	5	1,569	3.80
Hooker.....	575	3,049	3.48	9,349	24,949	2.67		19	

Howard.....	6,699	57,501	8.06	27,322	95,412	3.49	290	2,645	9.01
Jefferson.....	9,074	70,749	7.79	27,638	102,727	3.71	787	7,908	10.04
Johnson.....	6,070	78,735	11.72	17,808	73,278	3.11	910	13,076	14.36
Kearney.....	6,878	47,785	6.94	18,370	66,668	3.62	500	3,272	6.54
Keith.....	3,011	21,702	7.50	27,750	97,633	3.52	50	4,463	9.27
Keya Paha.....	2,984	38,210	4.11	7,692	80,838	4.08	212	2,319	11.00
Kimball.....	11,894	9,310	8.34	45,435	30,838	4.00	24	1,114	4.75
Knox.....	15,917	104,234	6.61	35,818	198,586	4.30	579	5,086	8.77
Lancaster.....	10,701	56,707	5.93	51,573	150,722	4.37	1,275	9,183	7.18
Lincoln.....	1,643	18,008	4.92	12,573	171,625	3.90	297	1,644	5.53
Logan.....	1,929	76,581	9.83	6,076	36,598	2.96	43	1,195	4.58
Loup.....	1,324	76,581	8.03	36,903	29,472	4.84	72	775	10.78
Madison.....	1,870	6,983	3.41	18,323	136,940	3.71	461	3,441	7.46
McPherson.....	6,084	42,706	7.83	36,233	45,918	2.50	49	2,245	7.00
Nemick.....	6,742	64,042	6.34	50,684	148,760	4.10	306	2,523	8.24
Nance.....	8,949	84,048	9.21	17,994	132,793	2.22	642	5,035	8.34
Nemaha.....	8,289	84,042	10.21	26,359	85,873	1.28	1,228	14,319	11.66
Nuckolls.....	10,202	97,074	10.51	26,509	149,298	5.66	755	8,190	10.84
Otoe.....	7,653	94,742	12.28	23,733	123,646	4.31	1,699	18,273	10.75
Pawnee.....	2,253	6,074	2.64	18,733	32,715	4.12	610	9,342	15.31
Perkins.....	7,709	43,772	7.10	26,579	32,715	1.97	28	1,948	1.89
Phelps.....	6,156	74,102	7.61	28,429	78,093	3.22	266	1,948	6.57
Pierce.....	10,328	78,512	18.45	23,373	96,040	3.37	321	2,233	6.97
Platte.....	7,655	34,695	7.61	23,374	117,120	3.52	428	3,551	8.30
Polk.....	6,276	24,954	7.04	10,324	72,773	2.13	552	4,607	8.34
Richardson.....	3,855	74,894	7.09	23,303	60,247	3.13	356	2,347	6.59
Rock.....	10,065	83,886	8.08	23,849	166,160	4.98	1,504	13,160	8.78
Saline.....	4,917	131,203	10.50	23,303	109,113	4.77	155	971	10.14
Saunders.....	12,436	33,045	7.58	23,303	58,842	3.73	720	7,304	10.14
Scott's Bluff.....	4,427	95,570	8.89	25,333	83,061	5.15	735	6,735	15.91
Seward.....	10,725	71,122	9.92	26,532	183,701	5.12	711	7,955	11.95
Sheridan.....	6,178	35,103	5.68	32,578	103,061	3.40	743	7,720	10.39
Sherman.....	5,267	40,125	7.61	32,578	251,498	3.98	88	1,618	7.18
Sioux.....	5,177	92,421	10.16	23,440	92,039	4.97	272	1,618	5.95
Stanton.....	9,026	52,981	10.68	23,440	24,314	6.47	35	429	12.25
Thayer.....	784	61,306	13.93	23,393	114,809	4.97	313	3,251	10.39
Thomas.....	4,393	41,800	5.45	23,393	99,569	3.36	24	1,208	5.18
Thurston.....	7,144	41,852	5.86	17,672	24,789	6.97	287	4,848	16.38
Valley.....	6,888	70,811	10.28	21,672	107,747	3.80	289	1,808	10.28
Washington.....	6,492	60,325	9.29	21,355	186,741	4.97	381	4,180	10.07
Wayne.....	7,951	78,027	9.81	23,812	105,541	3.54	345	3,128	9.06
Webster.....	1,696	89,177	3.62	23,297	120,589	4.56	712	8,049	11.07
Wheeler.....	10,869	89,177	8.20	28,150	166,618	5.44	771	6,071	8.49
York.....	659,983	\$5,109,094	\$7.74	2,313,495	\$10,336,825	\$4.46	39,040	\$375,743	\$9.40
Total.....									

COUNTIES	SHEEP			HOGS		
	NUMBER	VALUE	AV.	NUMBER	VALUE	AV.
Adams.....	733	\$395	\$0.54	17,071	\$17,821	\$1.04
Antelope.....	1,412	719	.50	23,716	33,016	1.39
Banner.....	5,336	3,987	.74	234	221	.94
Blaine.....	191	59	.50	597	1,024	2.00
Boone.....	604	597	.98	24,718	32,025	1.29
Box Butte.....	12,485	8,227	.66	437	611	1.40
Boyd.....	535	320	.60	11,788	14,818	1.25
Brown.....	542	542	1.00	4,069	8,003	1.97
Buffalo.....	8,747	3,149	.36	25,890	27,874	1.08
Burt.....	393	192	.49	39,814	67,137	1.68
Butler.....	422	151	.35	24,002	29,411	1.22
Cass.....	238	175	.58	13,028	34,971	2.68
Cedar.....	977	487	.50	40,246	57,985	1.44
Chase.....	3,838	2,273	.59	2,524	3,099	1.22
Cherry.....	4,422	2,625	.59	1,520	2,239	1.47
Cheyenne.....	12,948	7,991	.57	834	1,079	1.30
Clay.....	479	467	.97	18,613	26,749	1.43
Colfax.....	321	190	.59	21,435	23,267	1.08
Cuming.....	1,171	585	.50	38,533	38,533	1.00
Custer.....	1,367	495	.36	46,935	89,976	1.92
Dakota.....	40	20	.50	15,440	18,674	1.20
Dawes.....	17,526	11,639	.66	867	1,022	1.18
Dawson.....	2,205	825	.37	21,325	17,941	.84
Deuel.....	3,242	810	.25	2,092	523	.25
Dixon.....	58	30	1.52	24,478	24,600	1.00
Dodge.....	430	287	.67	27,789	28,093	1.01
Douglas.....	1,287	289	.23	12,275	17,735	1.44
Dundy.....	266	201	.75	3,398	4,904	1.44
Fillmore.....	366	88	.28	18,571	12,951	.69
Franklin.....	976	759	.77	16,797	21,229	1.26
Frontier.....	59	27	.45	11,029	16,045	1.45
Furnas.....	285	285	1.00	19,303	26,584	1.37
Gage.....	119	92	.79	36,678	51,242	1.39
Garfield.....	27	13	.48	13	3,453	1.12
Gosper.....	18	13	.72	11,881	8,649	.73
Grant.....	3	3	1.00	57	144	2.52
Greeley.....	963	480	.49	14,118	17,501	1.23
Hall.....	17,181	13,276	.77	21,154	14,980	.70
Hamilton.....	500	209	.42	31,906	46,709	1.46
Harlan.....	52	49	.94	12,479	16,005	1.28
Hayes.....	2,382	2,382	1.00	4,603	5,432	1.18
Hitchcock.....	8,149	2,445	.30	2,436	2,911	1.19
Holt.....	86	43	.50	15,480	6,540	.42
Hooker.....	86	43	.50	116	57	.49
Howard.....	3,569	2,059	.57	18,684	24,187	1.29
Jefferson.....	1,713	553	.32	22,917	30,975	1.35
Johnson.....	1,425	523	.36	16,072	21,765	1.35
Kearney.....	1,728	432	.25	16,238	21,430	1.31
Keith.....	149	100	.67	813	1,202	1.47
Keya Paha.....	35,665	17,831	.50	4,758	6,281	1.32
Kimball.....	662	500	.80	27	6	.26
Knox.....	2,808	1,042	.37	36,250	43,582	1.20
Lancaster.....	8,515	2,983	.35	31,221	32,521	1.04
Lincoln.....	908	670	.73	7,251	8,680	1.19
Logan.....	7,181	2,871	.40	1,486	1,903	1.28
Loup.....	11	11	1.00	2,596	5,480	2.11
Madison.....	2,304	1,011	.43	2,596	5,480	2.11
McPherson.....	1,685	793	.47	326	233	.71
Merrick.....	1,296	926	.71	16,169	21,795	1.34
Nance.....	185	50	.27	18,785	21,507	1.14
Nemaha.....	233	164	.70	21,880	29,298	1.38
Nuckolls.....	876	503	.57	22,446	29,085	1.29
Otoe.....	20,317	6,569	.32	26,273	36,103	1.33
Pawnee.....	16	12	.75	29,296	44,783	1.52
Perkins.....	1,191	398	.33	1,433	704	.49
Phelps.....	13,311	7,980	.59	19,050	23,251	1.22
Pierce.....	872	416	.47	21,200	25,034	1.13
Platte.....				33,727	26,821	.80
Polk.....				29,889	36,213	1.21

COUNTIES	SHEEP			HOGS		
	NUMBER	VALUE	AV.	NUMBER	VALUE	AV.
Red Willow.....	1,547	959	.62	12,377	13,530	1.09
Richardson.....	2,804	1,395	.49	37,304	52,892	1.42
Rock.....	1,582	1,582	1.00	1,494	1,922	1.28
Saline.....	815	409	.51	24,178	31,704	1.31
Sarpy.....	1,575	1,269	.80	11,111	21,864	2.86
Saunders.....	1,015	376	.37	34,378	44,867	1.30
Scott's Bluff.....	13,743	9,519	.62	1,015	2,442	2.40
Seward.....	1,059	662	.62	23,675	34,747	1.46
Sheridan.....	18,267	11,611	.63	918	1,313	1.63
Sherman.....	580	320	.55	12,877	16,293	1.26
Sioux.....	12,656	12,943	1.02	276	683	2.47
Stanton.....	1,838	689	.38	20,347	29,734	1.46
Thayer.....	61	41	.67	19,516	33,196	1.64
Thomas.....	2,185	591	.27	279	268	.96
Thurston.....	1,827	825	.45	9,031	19,745	2.18
Valley.....	325	185	.57	19,642	23,033	1.17
Washington.....	438	218	.49	31,095	32,968	1.06
Wayne.....	220	99	.45	27,066	28,633	1.05
Webster.....	671	309	.46	18,358	28,462	1.55
Wheeler.....	368	211	.57	2,978	3,613	1.21
York.....	800	600	.75	23,248	34,759	1.49
<b>Total.....</b>	<b>284,375</b>	<b>\$161,011</b>	<b>\$0.56</b>	<b>1,443,090</b>	<b>\$1,870,162</b>	<b>\$1.29</b>

## REAL ESTATE—LANDS

COUNTIES	IMPROVED			UNIMPROVED		
	ACRES	VALUE	AV.	ACRES	VALUE	AV.
Adams.....	285,460	\$1,035,651	\$3.62	59,490	\$95,645	\$1.60
Antelope.....	216,327	503,171	2.33	292,909	348,285	-1.19
Banner.....	27,136	13,568	.50	260,159	130,079	.50
Blaine.....	3,818	6,845	1.80	80,909	100,948	1.24
Boone.....	360,893	958,909	2.65	47,076	71,896	1.52
Box Butte.....	17,306	51,918	3.00	473,360	135,554	.28
Boyd.....	*278,020	655,914	2.35			
Brown.....	57,756	118,312	2.04	167,725	180,253	1.07
Buffalo.....	566,082	1,131,622	1.99	8,544	10,692	1.25
Burt.....	257,745	1,624,595	6.30	32,996	163,588	4.96
Butler.....	*363,605	1,290,556	3.54			
Cass.....	*341,012	2,726,370	8.00			
Cedar.....	330,645	1,532,362	4.63	112,912	407,179	3.60
Chase.....	*			437,618	331,546	.75
Cherry.....	5,362	71,502	1.31	600,908	521,760	.86
Cheyenne.....	42,488	68,704	1.62	781,863	425,310	.54
Clay.....	317,573	987,216	3.10	36,234	79,047	2.18
Colfax.....	241,061	1,412,412	5.86	9,474	57,982	6.12
Custer.....	431,926	638,345	1.48	916,881	806,687	.88
Cuming.....	*343,507	1,755,138	5.10			
Dakota.....	*158,056	930,446	5.87			
Dawes.....	*558,383	339,798	.60			
Dawson.....	313,922	585,955	1.87	273,889	320,928	1.18
Deuel.....	33,952	42,434	1.45	509,268	254,634	.50
Dixon.....	240,860	967,096	3.97	44,761	139,525	3.11
Dodge.....	*343,300	1,442,454	4.31			
Douglas.....	178,911	2,573,785	14.39	7,522	614,495	64.53
Dundy.....	60,965	64,792	1.06	297,331	245,649	.82
Fillmore.....	313,947	998,811	3.18	48,133	90,393	1.87
Franklin.....	235,794	504,673	2.14	113,060	152,982	1.35
Frontier.....	238,264	397,728	1.67	336,612	238,476	.70
Furnas.....	334,281	737,517	2.20	96,927	164,226	1.69
Gage.....	527,643	2,822,819	5.39	7,879	31,630	4.01
Garfield.....	3,955	30,171	7.62	78,133	73,928	.94
Gosper.....	139,301	346,607	2.49	142,080	174,068	1.22
Grant.....	39,138	96,380	2.46	16,000	5,000	.25
Greeley.....	126,072	296,203	2.34	198,525	351,815	1.77
Hall.....	292,695	1,058,262	3.62	36,790	64,291	1.74
Hamilton.....	310,335	1,492,608	4.49	29,499	82,925	2.81
Harlan.....	230,929	554,229	2.40	115,464	137,357	1.20
Hayes.....	*			374,797	252,916	.67
Hitchcock.....	213,642	269,489	1.26	196,952	201,820	1.03
Holt.....	120,545	184,737	1.53	1,594,420	1,418,677	1.33
Hooker.....	*			25,388	25,441	1.00
Howard.....	286,189	673,078	2.35	52,164	92,104	1.77
Jefferson.....	269,302	1,069,289	3.97	99,692	310,304	3.11
Johnson.....	*236,417	1,654,813	7.00			
Kearney.....	289,395	642,958	2.22	24,171	32,155	1.33
Keith.....	*			470,853	241,973	.51
Keya Paha.....	22,746	31,545	1.34	320,632	372,744	1.08
Kimball.....	6,790	14,290	2.10	363,311	182,752	.50
Knox.....	292,256	871,046	2.90	243,430	439,466	1.81
Lancaster.....	413,234	1,955,194	4.73	85,051	311,230	3.61
Lincoln.....	156,820	161,496	1.04	999,003	448,588	.45
Logan.....	*			116,290	131,751	1.13
Loup.....	*			95,943	118,427	1.23
Madison.....	244,862	988,524	4.03	105,072	297,097	2.82
McPherson.....	*			91,059	112,039	1.23
Merrick.....	174,009	555,525	3.19	111,534	267,231	2.39
Nance.....	202,881	749,203	3.68	75,704	219,767	2.90
Nemaha.....	246,650	2,710,800	6.60	2,879	9,360	3.25
Nuckolls.....	308,537	947,852	3.07	37,035	98,787	2.67
Otoe.....	*386,359	3,248,111	8.41			
Pawnee.....	*268,735	1,761,757	6.55			
Perkins.....	*			505,337	252,668	.50
Phelps.....	270,795	592,540	3.19	54,260	95,100	1.75

COUNTIES	IMPROVED			UNIMPROVED		
	ACRES	VALUE	Av.	ACRES	VALUE	Av.
Pierce.....	242,038	789,676	3.26	95,960	256,744	2.67
Platte.....	412,819	1,448,048	3.50	5,160	5,683	1.10
Polk.....	*267,193	841,537	3.15			
Red Willow.....	246,823	378,340	1.53	181,922	202,532	1.10
Richardson.....	*334,298	1,906,246	5.56			
Rock.....	28,546	40,646	1.45	261,998	269,229	1.02
Saline.....	331,512	1,461,957	4.40	30,180	128,522	4.25
Sarpy.....	141,995	1,333,270	9.38	6,624	31,512	4.75
Saunders.....	*467,415	1,984,348	4.24			
Scott's Bluff.....	42,016	179,147	4.26	174,612	174,612	1.00
Seward.....	*361,846	1,607,941	4.44			
Sheridan.....	39,343	34,715	.88	512,311	315,852	.61
Sherman.....	139,868	297,358	1.95	202,070	269,430	1.33
Sioux.....	33,824	67,753	2.03	168,412	84,197	.51
Stanton.....	151,090	703,294	4.65	124,305	452,236	3.64
Thayer.....	*353,800	1,596,495	4.51			
Thomas.....	13,689	16,261	1.18	21,842	18,987	.87
Thurston.....	*18,293	152,256	8.32			
Valley.....	161,931	369,587	2.28	177,127	197,594	1.11
Washington.....	*219,757	1,618,543	7.36			
Wayne.....	*269,432	1,334,845	4.96			
Webster.....	290,967	912,986	3.13	45,701	110,034	2.41
Wheeler.....*				179,681	212,061	1.18
York.....	*356,879	1,478,394	4.14			
Total.....	18,498,963	\$72,474,818	\$3.91	14,909,813	\$15,670,397	\$1.05

\*Improved and unimproved.



COUNTIES	Agricultural Implements, Tools, etc.
Adams. ....	\$14,105
Antelope. ....	17,953
Banner. ....	688
Blaine. ....	1,343
Boone. ....	14,575
Box Butte. ....	2,158
Boyd. ....	13,772
Brown. ....	6,029
Buffalo. ....	15,407
Burt. ....	13,958
Butler. ....	14,400
Cass. ....	19,277
Cedar. ....	21,562
Chase. ....	3,299
Cherry. ....	7,205
Cheyenne. ....	4,333
Clay. ....	19,467
Colfax. ....	15,465
Cuming. ....	15,000
Custer. ....	2,377
Dakota. ....	9,879
Dawes. ....	2,167
Dawson. ....	13,129
Deuel. ....	1,268
Dixon. ....	5,957
Dodge. ....	13,643
Douglas. ....	49,080
Dundy. ....	4,001
Fillmore. ....	17,942
Franklin. ....	9,348
*Frontier. ....	12,724
Furnas. ....	17,577
Gage. ....	27,049
Garfield. ....	2,801
Gosper. ....	11,067
Grant. ....	923
Greeley. ....	8,050
Hall. ....	12,228
Hamilton. ....	18,794
Harlan. ....	9,716
Hayes. ....	3,809
Hitchcock. ....	5,703
Holt. ....	11,908
Hooker. ....	287

COUNTIES	Agricultural Implements, Tools, etc.
Howard.....	12,674
Jefferson.....	14,694
Johnson.....	13,029
Kearney.....	10,031
Keith.....	1,403
Keya Paha.....	5,655
Kimball.....	15
Knox.....	17,341
Lancaster.....	28,727
Lincoln.....	8,450
Logan.....	1,675
Loup.....	2,727
Madison.....	39,231
McPherson.....	356
Merrick.....	7,458
Nance.....	8,204
Nemaha.....	13,415
Nuckolls.....	14,668
Otoe.....	28,503
Pawnee.....	15,106
Perkins.....	1,531
Phelps.....	12,376
Pierce.....	9,264
Platte.....	13,965
Polk.....	18,687
Red Willow.....	8,898
Richardson.....	12,809
Rock.....	4,815
Saline.....	29,026
Sarpy.....	10,384
Saunders.....	33,197
Scott's Bluff.....	3,944
Seward.....	19,304
Sheridan.....	4,308
Sherman.....	6,071
Sioux.....	2,341
Stanton.....	11,579
Thayer.....	21,621
Thomas.....	604
Thurston.....	13,499
Valley.....	7,814
Washington.....	14,516
Wayne.....	14,756
Webster.....	14,090

COUNTIES	Agricultural Implements, Tools, etc.
Wheeler.....	2,479
York.....	18,595
Total.....	<u>\$1,065,258</u>

President: Is the Auditing Committee ready with their report?

Mr. Morse: Yes sir.

### REPORT OF AUDITING COMMITTEE

*To the Nebraska State Board of Agriculture:* Your Auditing Committee has examined the 1903 accounts of your Secretary and Treasurer and find the same kept in a plain neat form, and correct.

All payments that have been made by your treasurer have been on warrants regularly drawn by your secretary, same being based on the order of your president on vouchers approved by this board of managers, or on the order of the full state board for premiums, fixed salaries, repairs and permanent improvements upon your grounds.

Balance on hand from 1902.....	\$1,557.42
Receipts for the year 1903.....	42,301.81

Total.....	<u>\$43,859.28</u>
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Warrants Paid Series of 1897.....	46.58
Warrants Paid Series of 1902.....	46.85
Warrants Paid Series of 1902.....	19.10
Warrants Paid Series of 1903.....	37,605.66
Cash to Balance on Hand.....	6,187.89

Total.....	<u>\$43,859.28</u>
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L. MORSE,  
SAMUEL RILEY,  
W. E. EWING.

You find the following No. Warrants of series, 1903, void, not being issued.

No. 21, 43, 69, 75, 81, 83, 248, 251, 337, 342, 267, 389, 392.

No. 21, 43, 69, 75, 81, 83, 83, 248, 251, 337, 342, 267, 389, 392, 689, 691, 984, 969, .....

Outstanding Warrants of series 1903: (Not presented for payment).

No.	
491.....	\$2.40
496.....	1.96
503.....	2.00
530.....	1.00
560.....	.30

No.	
591.	\$1.00
622.	2.40
643.	.25
660.	1.00
675.	1.00
787.	1.00
802.	1.50
910.	9.60
929.	2.00
938.	6.40
996.	166.65
997.	50.00
998.	14.30
999.	3.30
	<hr/>
	\$268.00

# REPORT OF CHAIRMAN BOARD OF MANAGERS.

(Here follows the report of the Board of Managers, read by the Chairman, Mr. Rudge as follows: Copy filed.)

*Mr. President and Members of the State Board of Agriculture:* As Chairman of your Board of Managers I am pleased to say that the fair held the past season was, I believe, as good as could be expected from the facilities the board has at the present time. It was instructive both to exhibitors and patrons and the report made by our secretary will show that the finances are in better shape than they have been for several years. The buildings were crowded and the board should aim each year, as fast as their finances will permit, to increase their capacity. In the past three years the board has used all available moneys they could to accommodate the stock exhibit and I might say somewhat to the detriment of other exhibitors, and I believe the time has come when other exhibitors should receive a little attention. In the management of the fair there are two classes of people that your board have to cater to, one is the agricultural and stock men and the other are the patrons of the speed department. In the past year we appropriated a small portion of our funds and made what proved to be the fastest half-mile track in the country and the attractions given on the track were the best that the state Fair ever had, and I think people went home well pleased with the entertainment.

New buildings and permanent improvements have been put on the grounds as follows:

One ladies' brick public comfort and water closet building with all sewer connections at a cost of ..... \$2,944.20

This was paid for by an appropriation made by the last legislature. From the funds of the Board the following improvements were made:

1 New Sheep Barn, 48x96, at a cost of ..... 1,318.00

2 New Hog Barns, at a cost of .....	1,070.00
Repairs on Race Track .....	1,050.00
Bleachers at Race Track .....	200.00
Purchase of Dairy Building and Refrigerator from Lancaster County Agricultural Society .....	250.00
New Floor in Bee Building .....	100.00
Estimated Value of Lumber on Hand .....	250.00
Making a total expenditure on Permanent Improvements .....	\$7,182.20

In addition to this there have been quite a number of permanent dining halls put in by private parties. Also four exhibitors have leased grounds and put up permanent buildings at a cost of not less than \$2,000.00. One of the most attractive is the band stand built by the American Steel & Wire Co. Others were put up by the Buckstaff Bros. Mfg. Co., W. C. Shinn, and Rymers & Freid.

#### RECOMMENDATIONS.

I beg leave to submit the following recommendations:

First, there should be some rule made to control the number of stalls and pens any one exhibitor should be entitled to, as there was herd after herd of stock brought to the fair for no other purpose than to sell, and in many cases were not entered for premiums, and in other cases were entered but not shown in the show ring. The state fair grounds make a good market at small expense when stalls can be had for the price asked in our premium list, and I trust the premium list committee will give this some attention.

Second, I recommend that as soon as possible additional accommodations be provided for patrons who attend the races by enlarging the amphitheatre. Also that a new administration building be built and additional space for poultry, and additional water-closets constructed.

Third, I recommend that the Board of Managers be instructed to have the Superintendent of Grounds' office in the city of Lincoln for at least two months before the opening of the fair and five days after the closing of the fair.

Fourth, I recommend that a new scale of salaries be made for all elective officers, including the Board of Managers, as there has been no material change made in salaries for some 14 years and which have met the requirements 14 years ago would not meet the requirements today.

All of which is respectfully submitted.

C. H. RUDGE,

Lincoln, Neb., Jan. 19, 1904.

*Chairman Board Managers.*

Mr. Cook: I move you that the chair appoint a committee of three to consider the different recommendations made by the officers in their reports and report tomorrow morning. The same receiving a second, was adopted.

President: The chair will make the announcement of the committee later. Are there any other committees to report at this time. It has been customary for a number of years before adjourning this session of the Board, to receive nominations to fill the term of office of those whose terms expire at this meeting. What is your pleasure?

Mr. McIntyre: I move, Mr. Chairman, that a committee of five be appointed as a nomination committee.

\*President: To receive and act upon the nominations. Seconded.

Mr. Mellor: I move to amend the motion by having the nominations first. Seconded.

President: The motion has been seconded. You have heard the motion, that a committee of five be appointed to whom shall be referred the nominations.

Mr. Mellor: I move to amend that the nominations be made first.

Mr. Bassett: I rise to a point of order, that the amendment is not germane to that motion at all. That is on another subject entirely; it is not a part of the motion to appoint a committee to whom the nominations shall be referred. This amendment is entirely out of order.

Mr. Mellor: For this reason, it is that the nominations should be made first: you make the nominations and appoint the committee, and then you don't appoint a committee composed of the people nominated.

President: The chair rules the point of order well taken.

The motion being put to a vote was declared by the chairman lost.

Mr. Mellor: I move you that we proceed with the nominations.

Upon receiving a second, the motion was adopted.

President: Nominations are now in order.

Mr. Mellor: Mr. Secretary, would it not be well for the Secretary to read the names of those whose terms will expire at this meeting.

Secretary Furnas: If you wish. The names of those who expire at this meeting are as follows:

V. Arnold . . . . .	Verdon, Richardson County.
S. C. Bassett . . . . .	Gibbon, Buffalo County.
E. L. Vance . . . . .	Pawnee City, Pawnee County.
Charles Mann . . . . .	Chadron, Dawes County.
E. McIntyre . . . . .	Seward, Seward County.
W. R. Mellor . . . . .	Loup City, Sherman County.
L. Morse . . . . .	Benkelman, Dundy County.
T. A. McKay . . . . .	Aurora, Hamilton County.
Peter Youngers . . . . .	Geneva, Fillmore County.
W. C. Hervey . . . . .	Omaha, Douglas County.
W. W. Cole . . . . .	Neligh, Antelope County.
W. Foster . . . . .	Lincoln, Lancaster County.

And there were two others who were elected to fill vacancies last year, Mr. R. M. Wolcott, of Archer, Merrick County, and E. Z. Russell of Herman, Cuming County.

Chairman: I wish to call attention to one matter particularly, that of Cyrus Horton, of Arapahoe, Furnas County. Last year, your committee in making their report to the Board got the figures of the places that were to be filled down all right, but they drew a line across one, and they reported the number one short to fill the requisite number. There never, to my knowledge, has been a ruling as to whether that appointment is for one or

two years. I call your attention to it for such action as you may think proper.

Mr. Bassett: I would like to ask for a ruling of the president whether the appointment was to fill a vacancy, or is for more than one year or not.

President: The office to be filled was for two years. I apply the same rule to it that would be applied in the election of officers in the state, that the officer appointed fills the vacancy until the next general election, which would be at this time.

Mr. McIntyre: In this connection, the list of names as read, comprise 14, whose terms expire at this meeting. The list last year comprised 15. The original law in the premises named 28, 14 for each year. So this 15 matter, I don't know how that crept in there, unless it was the same 15 years ago—and I am speaking from memory, and that is not very good—but I think that at the time that Governor Furnas had been a member of the Board for 21 consecutive years we felt we would throw him a bouquet, and we elected him an honorary member for life, and I suppose that is the way that number gets in there. He has been voted for and elected every two years. I don't know, the "honorary" part of it did not seem to wear only a couple of years. I simply call that up to show the shape we are in.

Member: I would like to inquire what the statute creating this Board called for?

Mr. McIntyre: 28.

Mr. Hervey: I beg leave to correct Mr. McIntyre on that. The law created the State Board of Agriculture in 1869—without there were 29 persons named—you will find on the statute book under the law, as passed at that time, the names of those 29. I have seen them, and there can be no question about that, the original law.

Secretary Furnas: What year.

Member: In 1869 the State Board of Agriculture was created. There was a Territorial Board of Agriculture created in 1858, and that was in existence until after Nebraska became a state in 1869. The State Board of Agriculture was filled by the election of 29 members.

Mr. Bassett: I will get the statutes.

Mr. McIntyre: I want to apologize for my error in this matter. I am very glad that Mr. Hervey has gone into this deeper than I had. I was speaking from hearsay, and supposed it was law.

The following names were placed in nomination by the different members:

Ed. McIntyre. ....	Seward County.
F. W. Hammond. ....	Hamilton County.
W. R. Mellor. ....	Sherman County.
R. M. Wolcott. ....	Merrick County.
L. Morse. ....	Dundy County.
T. A. McKay. ....	Hamilton County.
W. C. Hervey. ....	Douglas County.
O. E. Mickey. ....	Polk County.
Peter Youngers, jr. ....	Fillmore County.

M. B. Adkinson.....	York County.
W. W. Cole.....	Antelope County.
Joseph Roberts.....	Dodge County.
J. L. Rymearson.....	Madison County.
William Foster.....	Lancaster County.
E. F. Fassett.....	Washington County.
V. Arnold.....	Richardson County.
J. W. Hawes.....	Kearney County.
Elijah Filley.....	Gage County.
E. C. Russell.....	Cuming County.
S. C. Bassett.....	Buffalo County.
W. A. Apperson.....	Johnson County.
E. L. Vance.....	Pawnee County.
C. H. Mann.....	Dawes County.
Sanford Richards.....	Harlan County.
Mr. — Maxon.....	Kearney County.
D. T. Mount.....	Chase County.
W. E. Ritchie.....	Seward County.
M. C. Mulick.....	Sherman County.

Mr. Hervey: The number of men and names was not in the statute, it was in the legislative proceedings.

President: The statute before me does not appear to give the number of whom this Board shall be composed, but the original act named the charter members as it was originally passed. That was in the Territorial days. When the law was re-enacted in 1869, I don't know what they did.

Mr. Hervey: That was the same thing when it was a state board instead of the territorial board.

President: If I misstate Mr. Hervey's views, correct me. In securing the data for a work that has been published, he has had occasion to look up the statutory steps of the organization of this Board and filed it, and I have no doubt but that the statement that he makes as to the number is correct.

Mr. Bassett: I am quite positive that the membership of this Board is 28 persons. I had occasion to look it up before, but the present statute does not state the number of persons comprising the State Board.

President: A gentleman made a motion, which was seconded. It was that a committee of five be appointed to whom nominations shall be referred. Motion adopted.

President: I name as such committee,—

Mr. Bassett: I desire to know how many members of the Board there has to be elected.

Secretary Furnas: It must comprise 14 nominations for them to report back.

Mr. Bassett: This appointment to fill vacancies would make possible 17 names, I take it.

President: If the association will permit the chairman I will state that he does not attempt to state whether the question of the state board con-



sists of 28 or 29 members, but will simply state that for a good many years we have been recognizing the membership as of 29.

Mr. McIntyre: I was basing what I said on this paper only for this meeting, while Mr. Bassett had in his hands a premium list that contains more.

Mr. Bassett: Mr. Wilkinson was appointed to fill a vacancy I think, as I was on that committee that counted 28 names, and they claimed we was one short, and we appointed another making three additional names, so the committee did report 17 names.

President: The chairman will name as a committee to whom nominations will be referred the following:

W. F. Johnson, of Clay.

D. E. C. Long, of Nemaha.

W. C. Caley, of Knox.

G. R. Williams, of Douglas.

J. Watson Riley, of Boone.

What is your further pleasure.

Member: I would like to know the names of that committee.

President: This was the committee raised on the motion of Mr. Cook. The committee is Mr. Cook, Mr. Bassett, and Mr. Hanna. The chairman of this committee can make such designations as to the where and when the committee will meet as they agree to, which I think should be done before leaving the hall.

Mr. Williams: I have a resolution I would like to offer for this association, as follows:

*Resolved*, That all concessions partaking in the line of an immoral tendency or character, shall hereafter be forbidden places on the Nebraska State Fair Grounds.

I move the adoption of the resolution. Seconded.

Mr. Williams: I don't think it is very necessary to make an argument in favor of this resolution, not especially before the fathers and mothers of the rising generation that have been educated. I think contrary to their wishes, we should be very much surprised to come in here on this campus and find such exhibition of lawlessness and sometimes of immorality that takes place on the fair grounds. Therefore, I am very much in favor of this resolution and hope it will be passed. (Applause.)

Mr. Rudge: I think it hardly wise to pass a resolution of this kind. The concessions on the fair grounds are under the direction of the President of this association, and I believe after the experience of last year, he will control those matters without making it a matter of record. It shows somewhat a discredit on our president's administration in the past, and I don't think it is a thing that ought to be made a matter of record. I think with the information he received last year he will control these matters to the satisfaction of everybody.

President: I am in sympathy with the sentiment of the resolution. It is not last year, but it has been for more than one year, two or three of them, that we have had come onto our fair grounds shows that should not have been there. It is well known to some of you, that those show people were

called up to headquarters a number of times last year and cautioned and threatened that they would be put off the grounds, and every pressure brought to bear on them that could be. As long as representatives of the president were around there everything went along reasonably well but the minute they were out, they went unreasonably wrong. Now I think as a board of agriculture it is better for you not to put this on record and send it out to the world. I think it is better for you to discuss this matter here and let your officers know what the feeling is, and I think they will obey it. I want to say this, that had I known as much last year as I do today, there never would have been a single one of those side shows come onto the grounds whether we made \$1.00 or \$100,000.00. (Applause.)

Mr. Williams: In view of the past experience that we have had and been daily confronted with scenes that bordered on immorality, that we have educated the young to see it for years and that without a wail, I say the stain is upon this institution; that we have granted and permitted these immoral shows to come onto our grounds, and they have deliberately before thousands of people, gotten up and said that they have been sent for and brought here for the purpose of making this exhibition. The people have heard their stories, have seen their shows, and today, Mr. President, that odium is upon us just as much as if you had one of those tents out here on this campus. I say if we have sinned before the world, it is our duty to confess them and to reform, and show that all these institutions have got to go. The state board of Illinois were not ashamed to call their officers to account and ask that it be abolished altogether. It is time for us to wipe it out.

Mr. Richardson: As president of a county association, I think these things are very hard to control, and that some of these things creep in, and I would like to see that resolution go a little bit further, and give the officers of the State Board of Agriculture the authority that they may be removed from the grounds immediately.

Mr. Hervey: I think that Mr. Rudge's view in regard to this matter is the proper thing; it is conservative, and consistent, and right. If the agricultural board has been imposed upon, it is no reason that they have committed a wrong, or that we should publish before the world our mistakes. I don't think the resolution should be passed. I think there has been enough said here. There will be reports given yet that will recommend the correction of these matters, and I think with a matter of this kind, whenever you pass a resolution it becomes newspaper report, it is material then for the newspapers to publish and we would not want them to do it. While we all abhor it, I think the wise thing to do is just to quietly stop it right here, because there is no question in regard to the matter. The opinion and sentiment of the board of managers is such that such a thing can never occur again.

Member: I agree with the remarks of Mr. Rudge and the gentleman who has just spoken. I have had some experience in these things in the county fair, and find it is hard to always control these things. Nobody can say that these things can be obliterated, nor can they censure the Board.

I am informed that the gentleman was on that committee to look after that and reported that everything was all right along that line. It seems to me it will come with poor grace.

President: I want to say that Mr. Williams did call attention to the fact that things were going wrong.

Member: I move you in order to keep this out of the record and to put confidence in the men you have elected, and that they will manage the affair satisfactorily, that the resolution be laid on the table.

Mr. Bassett: I move that the resolution be withdrawn.

Mr. Williams: I brought it up for discussion, and I am willing to withdraw it. I withdraw the resolution.

President: I will ask that the reporters have no part of this in the discussion. I want to say in all frankness, if I have anything to do with the fair my voice will be for the no side shows, whether there be revenue in them or not.

What is your pleasure.

Mr. McIntyre: Move you we adjourn until 9 o'clock tomorrow morning.

President: Allow me to ask this question then. It was suggested that the Board should hold their meeting at the farm on Wednesday morning. Where does the Board want to meet.

Mr. Bassett: I think it is too late, because there is no room.

President: Before putting this motion to adjourn, the chair will call attention to the meeting which is to be held under the auspices of this Board. One of the foremost agriculturists in the United States in the matter of education, Prof. John Hamilton, is to speak this evening at this place.

Meeting adjourned.

## SECOND SESSION—Evening, 8 O'clock.

### University Chapel, Memorial Hall.

Evening meeting was opened with an organ recital by Dr. J. M. Mayhew, which was much appreciated and received a hearty encore, to which he responded with another selection.

Following this came the address of the evening by Prof. John Hamilton, on "Lessons from the Old World," being introduced by President Dinsmore, as follows:

President Dinsmore: Ladies and gentlemen: Perhaps I owe you an apology in calling this meeting to order, for having been late in arriving here, but the facts are that I had a committee to get to work, and it was pretty hard work to get them together and consequently I was late. I desire at this time to thank so many people for coming out to this meeting, the opening of the series of meetings in the interest of agriculture being held here. Its influence will go out over the state and as you go home to the various counties, you will take with you that that will help to send up young men and young women to this institution, that they may get a broader and a fuller understanding of their duties as agriculturists. There is no profession in the world that, in my mind, gives more time for the broadening out of the mind, the development of the better interests and industries

of man than does that of agriculture, and the young men and young women who come here and go home from this institution must be broader, better men and women than their fathers and mothers who were deprived of the privileges that you young people are enjoying. And with this I bespeak for each and every year an increased attendance, an increased interest in the University and in the agricultural education of the state, that our young men may come up and be better citizens, better men and women.

We will now ask Dean Bessey for a few words of welcome.

Prof. Bessey: It is always a very difficult thing to try to fill another man's place. It is always a very much more difficult thing to try to fill the place of a big man. I stand here and rattle around in the place that was to have been filled by Chancellor Andrews, but the railroad trains do not always run on schedule time, and he is some place westward, we hope, coming as fast as he can to Lincoln. He will be here as soon as the train gets in. In the meantime I have the very pleasant duty because it is a pleasant duty to welcome you here, and in doing so I want to assure you that the welcome is one which is just as genuine as we possibly can make it. The University has for many years desired to have the people who are interested in the industries of the state, who are interested in all the work of the state, to make this their home. I suppose that one of the privileges that comes to us as we get greater ourselves and a little heavier avoirdupois is to be somewhat reminiscent in welcoming a body of men to a place like this. I think it was the very first meeting of any public society that I spoke to in Nebraska, which was presided over by our presiding officer to-night, just about 20 years ago, not quite 20 years ago, and as I look back over what changes have come to us all in this time, I am profoundly thankful that I live in this good state of Nebraska, where progress is always possible (applause) and not only possible (applause) but, is an actual thing. At that time no body had yet thought of such things as asking the agricultural society or the horticultural society, or any of the other societies to meet on any ground owned by the University. In fact the University did not have much of anything to invite you to. On this campus there was but one building, what we now call University Hall, which was entirely inadequate even at that time. On the farm where many of you have been today and will be for the next two or three days, there was a fraction of one of the barns which is now there, and it was a very small and poor fraction; it was a very poor sort of a barn. There were two buildings besides that one, the old stone house, and the other, the square wooden building, the latter having a very few students rooming in some very small and very dirty rooms. They were very poor students. The whole affair out there was very poor, and I remember that some of the members of this society said so, at that very same meeting, very emphatically too. Now as we look over the campus, and as we go and look over the farm and farm buildings, those which have been there some years, and those which are now just being finished, I think we can thank the Lord that we live in Nebraska where progress is an actual thing.

Gentlemen and ladies, I am glad to welcome you on behalf of the univer-

sity; on behalf of the regents and chancellor. I wish he were here to give you some of those inspiring words of his which come always from his heart, for I can assure you that he is heart and soul in the work that you are interested in. I hope you will come here every year to the campus and farm, and bring year by year your children with you, send them year by year to us, and we will do the best we possibly can for them. Come every year and be assured that you are welcome. (Applause.)

President Dinsmore: Gentlemen, we have with us tonight a gentleman that has been recently honored by having been called by the people of this state as one of those who should help guide and direct the affairs of this institution, a farmer, a man of broad views of many sides, and all of them straight. We will call on Mr. Regent Whitmore for a word of response. (Applause.)

Mr. Regent Whitmore: I trust you will pardon me for responding to the call for Chancellor Whitmore. I have not come to that distinction yet, but I take it that was simply a slip of Mr. Dinsmore's tongue, and he should have introduced your regent-elect instead of chancellor. I never was more forcibly reminded when Dr. Peters came back from his trip a few months ago of the fact that either Dr. Peters is a liar, or else I am growing old pretty rapidly, for he said in response to my protest against being trotted up here at this time, that here are 200 young men who have never heard you talk. Now my judgment is that Dr. Peters was lying, and that I am not so much of an old fossil as he would have me believe, for certainly gentlemen some of you know that for the last, I will not undertake to say how many years, but certainly ever since the year one, I have been responding to these addresses of welcome on the part of the farmers of this state. It has been my pleasure to respond to addresses of welcome from the Chancellor of your University ever since I can remember, and it is getting to be something of a chestnut at our house, and it had gone on so long and so frequently that actually it seemed to me that the resemblance of the associations of people, the place and all must have led me into repeating some of the ideas if not the language which I have used on similar occasions before. I said to my wife at one time when I had been asked to do this act for the societies, that I was very much afraid that I might be repeating things over and over that I had said before. She said by way of consolation to me, there is no probability that anybody down there ever remembers anything that you say anyway (laughter) and I have that for a consolation tonight.

I was called up here as I understand it to respond for the assembled agricultural activities of the state represented on the floor, and yet the presiding officer seemed to have trotted me out as representing in some degree the university itself, and so I am reminded of that tale related by Lockhart, I think it was, who told a story of a man who on hearing of the death of a wife of a friend of his set out to dictate a letter to his friend, and he said to his secretary, "Dear Sir: Allow me to congratulate you on the recent death of your dear wife." Why, says the secretary, congratulate, that is not the word, you want to say condole. Well, he says, con-

dole, congratulate, congratulate, condole, they are synonymous terms; anyhow, let it stand as it is. And so I am here partly as the representative of the university, and partly to respond, on behalf of the farmers, and I hardly know whether I or you are to be condoled or congratulated. (Laughter.)

It is only fair to the management and you and myself to say that I had for once come to think that it was safe for me to come down to Lincoln and sit back in a chair in the rear and enjoy it without any thought of being called on to say a word. I was not on any program and had no expectation to be called upon to say a word this week. I am sorry that they could not have done better. But now that I am here, I do want to indulge just a little in reminiscences as Dean Bessey has. I was in almost at the beginning of things in Nebraska, more than a quarter of a century ago. I settled upon a farm which is still my home. I was one of those with a few who I see here, who attended these meetings of the agricultural societies of this state more than 25 years ago. And when I recall what these gatherings looked like, and what this audience of young men tonight looks like, I can agree with the Dean that Nebraska has certainly made wonderful progress, for I take it that this audience of young men mostly tonight represents the present status of Nebraska agriculture, I take it that you represent not only the brawn but the brain of Nebraska agricultural activities—that those meetings in those days, comprising about a dozen men, scarcely more than that, year after year, here and from over the state met, renewing acquaintances and having quite a good time and getting considerable fun and some good out of it all. Now how it has all changed, and the allied and agricultural and livestock societies of this city get together here for a week in a systematic manner, with speakers brought from all parts of the United States, gentlemen of prominence in their different spheres, to spend a week in acquiring the very best kind of education; of comparing notes to see what the year has done for us, and in making plans for the future. I think it is a decided mark of evidence of agricultural progress or change that has come over us, and there is no more inspiring sight to me than to come down here and see a magnificent audience of the young agriculturalists of this state gathered for this purpose. Perhaps it is no more than proper for me to say on behalf of myself that it seemed to some people, and I confess that I conceded that that was correct, that in a great agricultural state like Nebraska it was no more than fair, it was no more than just an no more than right that there should, upon the board of regents of her chief institution of learning, be one representative at least of the agricultural class. And you in your wisdom have seen fit to elect your humble servant to the Board of Regents of the University for six years ensuing. I have not qualified, and I am warned by the experience of one of our United States Senators in the court at Omaha recently that it is not safe to assume the role of Regent until I have taken the oath of office. (Laughter and applause.) I take it that you will see the point and take any remarks which I may drop here as of a personal sort rather than official, because I am not hankering around after any of the notoriety that some of the people down here get into. (Laughter.)

It is not too much to say that the agricultural interests of this state are being looked after in connection with the University and the School of agriculture in recent years in a way that they were never before, and I only hope that my coming into the board will, in some measure, meet the desires, and I might say perhaps, the expectations of some of my sanguine friends. It will be my wish and my endeavor to second the efforts of our splendid chancellor and those who are associated with him in the conduct of the work. (Applause.) I will not take your time further in undertaking to respond either for the audience or for the University.

I congratulate you all upon the progress we are making, and I sincerely hope that the Chancellor will come in and speak for the University before I am through. In that connection I want to say right here that it seems a little bit ridiculous to those who know the history of this city and state to hear Dean Bessey tell about rattling around in the place of another when we all know that the only obstacle in the way of his being the Chancellor of this great University a few years ago, was his own action in declining the high honor. (Applause.)

President: Ladies and Gentlemen: We are so fortunate as to have with us tonight a gentleman from abroad who has given considerable time to the subject of agricultural education in one of the sister states, who has given perhaps more time—I won't say more time but thorough time—to the advancement of the farmers' institutes throughout the nation, who has come here as a representative of the farmers' institute in connection with our department of agriculture at Washington. I refer to Prof. John Hamilton, who will now address you.

President Dinsmore: The hour having arrived for which this meeting was called, we will come to order. The Secretary will call the roll.

Secretary Furnas: Roll call shows a quorum present, Mr. President.

President: Being a quorum present, what is your pleasure.

Mr. Mellor: I move you that the treasurer be instructed to draw a warrant, or rather the board of managers, for the payment to each delegate of the sum of \$6.00 for the purpose of defraying hotel expenses. Seconded. Adopted.

President: I wish to call attention to the fact that I doubt not is an oversight, the Secretary last year was requested to remit to the Secretary of the International Fairs Association management our dues for last year. When in Chicago attending the meeting, he asked if we had not forgotten it, and said he had not received the dues for the year that closed the first of December. I told him that I would bring it up at this meeting. I think we should pay these dues and also for the current year.

Secretary Furnas: I think you are mistaken as to last year. I feel sure that it was paid. He would never have allowed us to enjoy the privileges of the Association unless it was paid; I can easily look it up in a few minutes when I get hold of them; they are not now in my possession. There has been a change of secretaries since last year. John True of Madison, Wisconsin, is secretary. I think you meant the American Trotting Association. I think that is true.

Mr.——: How much are these dues?

President: \$25.00 a year.

Mr.——: I move you then that a warrant be drawn for \$25 for the year 1903, and also for the year 1904 for the dues from this Association going to the American Trotting Association. Adopted.

President: Is the committee appointed last evening on the recommendation of officers ready to report.

Mr. Cook: The committee is ready to report.

President: Come forward and we will listen to the report.

Mr. Cook: Your committee to whom was referred the address of the President, the report of the Secretary and Chairman of the Board of Managers, have had the same under consideration, and have the following recommendations to offer:

#### REPORT OF COMMITTEE ON RECOMMENDATION OF OFFICERS.

Mr. President: Your committee to whom was referred the address of the President and the reports of the Secretary and the Chairman of the Board of Managers, have had the same under consideration and respectfully submit the following recommendations:

That a limit be placed on the number of stalls or pens assigned to an exhibitor of live stock:

That if, in the judgment of the Board of Managers, funds are available, an administration building be erected and brick cross-walks be provided in the vicinity of the head-quarter building:

That, under instructions from the Board of Managers, the General Superintendent have charge of the assignment of space on fair grounds and that he have an office in the city of Lincoln for such period both before and after the annual fair, as said board may deem necessary.

In regard to the erection of a stock pavillion additions to amphitheater, water closets, etc: Such improvements are necessary and should be made whenever the financial condition of the Board will permit.

In the judgment of your committee the financial resources of the Board are not such as to warrant the repeal of rule 23 or the free use of stalls and pens by the exhibitors.

In the matter of a readjustment of the salaries paid officers of the Board, your committee finds a considerable difference of opinion as to the amount to be paid, under the rules of the Board, for the support of the office of Secretary.

Your committee recommends that the salaries paid the various officers of the Board remain as at present, it being understood that the salary of \$2,000 paid the Secretary is in full of all compensation for services and clerical help necessary for the support of said office other than extra clerks needed immediately preceding and during the fair and in the folding and mailing of advertising matter connected with the fair.

In view of differences of opinion as to amount to be paid as salaries, your committee begs to suggest that article 12 of the by-laws be amended so as to provide that warrants drawn for the payment of fixed salaries or for appro-



priations by the State Board while in session shall be on vouchers approved by either the President or the Chairman of the Board of Managers.

H. L. COOK, Chairman.

DAVID HANNA,

S. C. BASSETT.

President: You have heard the report of the committee. What will you do with the report of the committee?

Mr. McIntyre: I move the adoption of the report. Seconded.

Mr. Mount: Where it states that \$2,000 shall be full compensation for the salary of the Secretary and all help that might be needed, that places him in a position, in case something might come up and they need more help, that he would be unable to have the necessary help to help out the clerical help of his office. We don't know for sure. I think it would be well to leave that matter with the Board of Managers. If he should find that it was necessary to have more help in order to carry out the wishes and the welfare of the Fair, let them submit that to the Board of Managers, and if they think necessary, and they had the expense themselves instead of leaving it in the hands of the Secretary and perhaps hamper him in this work. If he has got to have more help why, he has got to take it out of the \$2,000, which might not be sufficient compensation for this.

Secretary Furnas: Perhaps I ought not to say anything in this matter but I feel that it is but just all around that I state these facts. The salary was fixed in every respect and all the pay of the Secretary without any consultation with him or suggestion on his part, twenty years ago, when there wasn't one-fourth of the work to do that there is now.

There is not a state in the Union that pays as small compensation as does Nebraska, and I think none of them do more work. This \$2,000 was fixed originally as the salary of the Secretary, and the Secretary was to bring in accounts for extra service from time to time, and was referred to a committee of which Mr. McIntyre was chairman. Those sums amounted to from \$600 to \$800 a year for typewriting and for clerk hire that is necessary before the Fair, and for office rent, lights and fuel. Finally on the recommendation of committee, \$600 was set apart for office rent and clerk hire that is necessary before the Fair, and lights and fuel connected with the office. While I will submit cheerfully to what you may do in this matter, the duties of the office can't be performed for less money than you have been paying and have it done as it ought to be. I feel it my duty to state that fact. I give it all my time and ability and experience of years, but you will dispose of this matter as you see fit.

Mr. Wilson: (Fillmore Co.) I would like to ask for information. If I understand Governor Furnas this salary as fixed heretofore, has been practically \$2,000, with \$600 for office rent and clerk hire. This recommendation of the committee is that it be confined to \$2,000, cutting off the \$600?

President: That is right.

Mr. Wilson: I would like to ask for further information of the committee. When the committee made this recommendation they probably had reasons

for making the recommendation. I would like to ask the chairman of that committee what these reasons were?

President: Mr. Cook is asked as chairman of the committee for the reasons of the report.

Mr. Cook: Of course this matter came up before the committee and they took advice from a great many, and as we stated, there was some difference of opinion. I might say just to enlighten the gentleman that the salary as recommended by the committee would be \$2,000 with additional expense of clerk hire just immediately preceding the Fair and during the Fair, and for expense of sending out printed matter, etc., so it is not really just \$2,000; the clerk hire and the expense that attached to the Secretary's office during the Fair, leaving the Secretary \$2,000 without that additional expense. And it was then thought by the committee that that would be about right according to the judgment of a great many.

Secretary Furnas: Allow me to say one other thing which I forgot. To show what appropriations have been made in support of the Secretary's office, that since I have been Secretary of this Board I have paid out more than \$6,000 out of my own private money. Three years I had no salary at all, and I have contributed \$500 to \$600, and a good many items, amounting to over \$6,000, so it has not taken care of itself even with the appropriation of \$2,600.

Mr. Cook: I neglected to speak of one thing. The idea of the committee in changing this was from this fact. We learned from sources that was creditable that this \$600 that was appropriated one year for the expenses was simply for that year alone; that the salary fixed for the Secretary was \$2,000 and has never been changed. But one year when there was no Fair, and the Secretary, I believe, was acting without compensation on account of there being no income, they passed a resolution of that kind that there should be clerk hire and expense during that year of \$600. Now we considered that that was just for that year, and has been carried all along during these years, and construed that it was meant for all time instead of that year. If we are wrong about that it might make some difference with the recommendations of the committee.

Mr. Williams: I believe it is not wisdom for this Board to cripple the Secretary's office. He is our Fair maker to a great extent. Satisfied as I am that the office is well conducted and there is none employed in the office without sufficient labor to keep them busy, therefore I think that at this stage it would be very unwise to cripple the service of the office.

Mr. Mount: It is the duty of the Secretary to execute and carry out the orders of the Board of Managers. Now he is a forerunner of the Fair. His duty commences as soon as he is elected, right now for a year ahead. We will take it three or four months before the Fair comes on, there are premium lists to send out and posters to send out, which is no small task; it is a big undertaking. It is not a matter of sitting down in your office and thinking that over. You have got to execute it. I know exactly what it is, and I think it is foolish to cripple the Secretary's office in the least; it is the head and shoulders of the whole Fair. I think \$2,000 is small enough. I know

that the Board of Managers will do what is right, but I have full confidence that whatever they may do will be what is right. I don't believe in crippling our Fair for a few hundred dollars.

President: If you will pardon the chair, I would like to make a statement. I am sorry I haven't the letters in my pocket to take them up with the statement. The statement that I make covers the states of Iowa, Minnesota, Illinois and Wisconsin, all of which states furnish at the expense of the state, office rooms for their Secretary, fuel and lights that he has no expense with. There is not one of them that does not pay a considerable sum more for Secretary's salary than we are paying, and in some instances they pay more for clerk hire than we are paying our Secretary and the clerk.

Gentlemen, are you ready for the question?

Mr. Rudge: I wish to say in behalf of the recommendation that was made in my report to explain myself; that when this matter came before the committee last night, I was invited up before the committee; and in regard to the \$600 paid the Secretary, I want to make it clear if I can, that the Board of Managers were not aware that we were paying this \$600 until at the close of the last Fair. We have been doing it some two years, and I think I am safe in saying that the President didn't know that we were paying \$600 a year. I am perfectly willing to pay \$600 a year, but I believe it ought to be a matter of record, so that the Board of Managers will not be criticized in paying it. It ought to be a matter of record. The information spoken of came from a member of the Board, a great deal older member of the Board than myself, so that his understanding in regard to the \$600 came from a good source, and the recommendation I made there was so that there would be an understanding, so that there would be no friction in regard to what we were paying and what we were not paying.

President: I think that the salaries of all officers that they should be in our by-laws and not by resolution.

Mr. McIntyre: Originally, going back to 1890-1891, we'll turn back to that report for that year, you will see where that committee referred to came in, this matter that Mr. Rudge referred to. The committee recommended at that time that an appropriation of \$600 be set apart. The report failed to suggest or say that it be paid out on voucher. That was the thought that prevailed in my mind at the time. I was late in getting in, but I am quite in touch with this. We don't want to cripple any officer of this Association, no matter who is in, or what place he is filling. I got the impression that it was for this year. The Board of Managers could authorize the Secretary on his suggestion, to meet any emergency. That was the impression that I got. I thought that part of it was left in the discretion of the Board of Managers. I am glad to have this brought up, because there is nothing that makes any better feeling than these open discussions in this Board.

Mr. Mount: I would be, if the committee would be, willing to add something about like this in reference to the expenses of the Secretary's office, or the salary of the Secretary, that so much as relates to the Secretary's office be over and above \$2,000.

(Explanatory: The Board met in the same hall in which the University

morning Chapel exercises are held. When Chapel service was called, the Board suspended its work, and participated with the students. The Board work is resumed after exercises, taking up the work where it suspended.)

### CHAPEL EXERCISES.

Prof.——: I understood we were to have with us Prof. S———of the the University of Indiana, but he cannot be with us as I am informed, so there is always a good way out of a difficulty. I thought that I would surely have to do the speaking myself, but there is a better way out of it. I saw Mr. J. B. Dinsmore, and I knew I had the right man, so he will address you this morning. What he will say will be good.

Mr. J. B. Dinsmore: Mr. Chairman, Ladies and Gentlemen: I am of the opinion that the Chairman has made a mistake as to what he says is the better way. I think he would have said much that would have pleased you better than what I would have; he would have said that which would have pleased you better. However, I will occupy your attention for a few minutes. The State Board of Agriculture, in session at this time, as some of you are perhaps aware, is a state institution for the purpose of several things, among others the holding of an annual exhibition upon the Fair grounds as the state Fair. This is but really a small part of what we hope to do by reason of that exhibit. It is to bring together and present to the people of the state the better, I may say, the finished product of the hands of our agriculturists, our mechanics and those of hand-craft, that it may be compared by the people that come up with the every day home product that they see all about them. It is by this comparison that the finished product, the best we have with that which is not so finished, that we are in hopes to encourage the farmers, the artisan and those of hand-work to keep on and strive to do better and make a further advancement. Last evening in this hall my attention was called to the fact of the improvements that are visible within the reach of every agriculturist in the state, within the reach of every person in the state. The addition of but one pound of flesh, the value of one pound of flesh to the weight of the chickens of this state will pay our public debt in a single year.

The addition of but one dozen of eggs to that as now being produced by the hens would more than three times pay the public debt of this state. These things are within the reach of the farmer; they are within the reach of the village resident. Those are little things, too little to attract our attention, and yet in the aggregate they amount to a good deal. It is the little things that we are overlooking day by day, that we of the State Board of Agriculture are endeavoring to attract your attention and cause you to stop and think, and adopt better ways by which you will increase your own wealth and the wealth of the state, giving the people of the state, chance to have better homes and enjoy better things that those of the older generations were deprived of. But if the young people who are now in the University will take up these thoughts and carry them out, work them out along the lines which the State Board of Agriculture are trying to present to the people year by year, and day by day, the State of Nebraska may become, not in one year but in a very few years, one of the most prosperous, one of

the most wealthy states of the western states. We are young. Many of our people want to commence where their fathers and mothers left off. You will never do it successfully. You want to commence and work up your own pathway, up the hill of life, make your own homes, make your own tastes and your own schedule of expenditures, but always try to keep them within the limits of the revenue derived. By doing this you will enjoy life much better, you will enjoy the privileges that you will otherwise be deprived of; you will make the home content, you will bring up the children with the hope of a better life and better state and better home. Without the home in its fullest sense, the state is but an empty bubble, and therefore make the home what it should be. Stop the little leaks, add to that the little revenue we now have by increasing the little things, and the result will be surprising to all. (Applause.)

Prof.——: Suppose we call on Chancellor Andrews to give his experience out on the Pacific Coast with some live stock meeting held out there. We would like to hear from him.

Chancellor Andrews: I had the honor last week to attend the convention of the National Live Stock Association at Portland. By the courtesy and desire of the good of the commonwealth I went not only as one of the experts of the United States, but also as a delegate. I thought it was very funny I should be the only delegate to attend, myself personally, never participated in the ownership of any creature other than a *fat calf which I lived to eat*. Having some relation to a plain where there is a good deal of live stock, upon second thought I did not regard the situation as a funny one. I don't think the Pacific Coast is in it with Nebraska as far as climate is concerned. I had the ague every day I was there because it rained. Very unpleasant weather when one is accustomed to Nebraska weather.

I was pleased to observe the respect which all the men of that organization seemed to have for this state. When any opinion from any one from this state was given it met with hearty applause, and there were references again and again to the live stock industry of the people who are in charge of it, and all of these were in the most respectful way. There were some of the most momentous questions of our times discussed in that convention. I am bound to say, and I said it all the while I was listening, I never heard better speaking in all my life anywhere—in congress, in state legislatures, in the State Board of Agriculture, in a college or university, none that was the average of the speaking in that convention. Much of it was extraordinary, and some of it simply wonderful, and it was remarkable that although there were different views expressed, and each side was represented by the ablest talent that could be gathered in this country, how they all kept perfect their heads. One of the discussions was on the question of forest reservations, and one of the finest speakers I ever listened to, the present Governor of Utah, denounced that policy. His wit, satire, rhetoric and poetry were immense. There was a gentleman of some age from Montana, I think, who sat directly in front of me, and I observed the old gentleman, as this eloquent speaker went on with his eloquence against the policy that he was condemning, shaking his head, as much as saying, you are all wrong. After he had

concluded the head of the forestry department of the United States of America replied, and in a few very simple statements, showed what the real purpose of the government was. I think he demolished most of the arguments brought forward by the Governor's remarks. At any rate when the resolution came to be voted upon, it was clear that the convention had been perfectly level-headed upon this all important theme. As I started to say, when the vote was taken and the resolution was passed, it was what I am sure the level-headed people of this country would have approved. Undoubtedly some of these resolutions appeared in the daily papers, although I have not seen any of them. When the report of this meeting is published, you will observe that the resolution on that head was extremely wise; that the representatives of this great industry, gathered from the four quarters of this great country, that they did not lose their heads on account or oratory.

Another subject that was taken up and discussed, was the question of the packers' trust, as it is called, and the feeling on the subject was probably altogether one sided in the convention. And yet, although the packers' side had not been represented at all, when the vote was taken and resolution was adopted it was surprising to see the tempers and the moderation of those gentlemen. Because they were all interested on the one side yet they knew somehow there must be something else on the other side.

When the same general question of the transportation of live stock on the railroads had been discussed there was for the most part one feeling, and that was that the rates at present were too high and the service too poor; that trains containing live stock were transported over the railroads at too slow a rate, and that care in general for this whole industry was not what it ought to be. There was no general denunciation. It was a very moderate resolution, and was finally adopted, and with it as a part of it, was the resolution that representatives of the live stock association should meet with as many representatives of the great transcontinental lines as they could get to meet with them and lay the situation before them in a perfectly feasible way, before any effort was made toward agitation. The most radical action the gentlemen present wished to adopt was to go into every state and endeavor to have created what has already been created in the state of Texas, a state railway commission, elected by the people—not appointed by the governor. It was thought that this would pretty nearly cure all evils, but that was not recommended by the convention when it came to determining what voice it should utter forth on this question, but something more modern and feasible.

Another subject discussed was the creation of an independent packer in Denver or Kansas City or in Omaha, or perhaps or not very far out away from Lincoln, and no doubt very considerable advance was made towards a scheme like that. All these matters were debated over and again. They were debated by very able speakers on the floor and platform, and I was impressed as never before by any convention. Some from almost every state in the Union, although of course the mountain and Pacific states were more largely represented than the states in the east. I think I never saw

more preparations in my life, with the power of the average American humanity to govern itself, to look out for its own interest, with every temptation to go to extremes, and you know what a temptation any impassioned orator brings to bear upon us with the temptation of personal interest beyond, it was impossible to stampede those men into hasty and foolish action, and I believe those who made the bitterest denunciations when later on they come to read the report will say it was a perfectly sane convention. No rash utterances of individuals has a right to go forth as representing the convention itself. I could not say to your State Board, with reference to the present condition of the live stock interests, that it was altogether the best. Conditions were not satisfactory; railroad rates were thought to be too high. It was thought that a considerable part of the prices that live stock ought to bring to the raiser and marketer was being held back by the packer. Notwithstanding all this, I did not find any gentlemen who seemed to have any thought of selling out. They thought it was a good industry to engage in, and that light would break in upon the present darkness, and naturally all holders of stock would do well to hang on to their stock.

I was very sorry to be so nearly alone as the sole delegate of this state. On one or two occasions I wished to consult with a member, and I looked around and found it difficult to find even a single Nebraskan with whom to consult. I wish that the state could have been represented vastly more largely. Every one in this convention has the greatest possible respect for the State of Nebraska. I was proud indeed more than once to be one of the several dairymen's representatives of the state in that convention and represent you, rather that I could be there to speak up with the stockmen, even if other members of their delegation were not present. I am sure the members of the State Board will wait the published official proceedings of this meeting with a great deal of interest, and when that report comes you will read the addresses that were delivered there, and the debates that were had there, with even greater interest.

All agreed that it was the best convention ever had, and all agreed that if the voice of the association had not been sufficiently heard in the various councils of the land, it would certainly be so hereafter. I have to say in conclusion, it seemed to me that the proceedings in this meeting were the most admirable and eloquent of every thought I have ever observed anywhere. All proceedings of the convention were correct, the meetings began on time. That is all this morning. (Applause.)

[Here the work of the Board was resumed.]

Mr. Mount: I feel sure we all feel better for going through the exercises which we have. Returning to the point which was under discussion in regard to the committee report I suggested that I did not like to reject the committee's report, and still I did not like to adopt it as it is now; and I suggested further that if there could not be a clause, something of that kind added after the item in relation to the salary of the Secretary, and that was this: That all expenses in relation to the Secretary's office prior other than above his salary be submitted to the Board of Managers for their recom-

mentation before the expense was made. That would leave it all in the discretion of the Board of Managers to decide whether this expense should be made or not. I think something like that would cover that ground, and bring the expense within the Board of Managers so we would know what they were doing. The Secretary could anticipate a few weeks ahead what his expense would be in the next month. I know two or three months before the Fair there is a great deal to do and if you cripple his office you cripple the entire Fair. We should not for the paltry sum of a few hundred dollars tie our hands. That is my sentiment.

Mr. McIntyre: I move to amend the report in this, that we set apart \$600 for this purpose to be expended in the discretion of the Board of Managers so we will all understand. That puts it back where it was before.

Mr. Cook: I second the motion that Mr. McIntyre has made, and I think that this convention will understand that this part of the report that was made by this committee was simply to get this before this body in an intelligent motion.

Mr. Mount: If the committee is mind to adopt in the report or accept some other amendment without rejection You cannot amend a report; it is not their report, but if they are willing to adopt that, I am willing.

President: Is there any objection on the part of the committee to the amendment offered by Mr. McIntyre and accepted by the chairman of the committee. Hearing none are you ready for the amendment. Amendment adopted.

The question now recurs upon the adoption of the report as amended.

Mr. Mellor: There is another question in there. We already have a general superintendent on our list. I would suggest, and move you that the words "General Superintendent" be changed to "Superintendent of Grounds." Now Mr. Cook says that is the way it was read that way. The duties of this person to be appointed are entirely at variance with those of "General Superintendent."

President: If the chairman of the committee has the report, will he read that portion of it.

Mr. ———: I think that was probably copied wrong. The intention of this committee, as I understand it, was that it should be "Superintendent of Grounds." Now if it is not that way and there is no objection on the part of the committee, I should like to have the manuscript changed to meet that requirement.

President: Is there any objection on the part of the association to the committee changing the wording of that report, if it is found to be worded wrong.

Mr. Rudge: The only objection I see to that, it is creating another office. Do we want to create another office? Now the General Superintendent's duties in the past two years, is what the Board have required of him. Now if we have a general Superintendent, is it necessary to have another Superintendent. Now the way the motion would read you would be creating another office. You would have a General Superintendent and a Superintendent of Grounds. I think they should be one and the same person.



Secretary Furnas: I think the term "General Superintendent" would cover it all.

Mr. Mellor: The reason this matter was brought up in this manner was to relieve both the Secretary and Mr. Rudge; that is, relieve them of the duties that heretofore had partially been performed by them. It is almost necessary for the welfare of the Fair that a person should be here in Lincoln to allot space to implement men and grant concessions for different reasons. Mr. Rudge in the kindness of his heart has been doing this labor for the Board, and we have an idea that some man ought to do this labor because there is an enormous amount of correspondence connected with it. I think Mr. Cook will bear me out that his letter list as Superintendent of Machinery last year was something great. This letter list possibly would fall upon the duty of the Secretary if he was here in Lincoln. Otherwise, it has been Mr. Rudge's duty as chairman of the Board to attend to this. Now the idea I think that the committee had was to relieve these two gentlemen, and to work for the best interest of this Fair Association, and we must either have this work done by somebody that is already on the Board, or else we must create an office. That is the reason that this recommendation is made.

Mr. McIntyre; I don't believe that it is good policy for this Board to create another office, as Mr. Mellor explains it.

Mr. Mellor: You have got it mixed; the duties would not conflict at all.

Mr. McIntyre: I believe I would leave it to the incoming Board to fix it up.

President: The chair may have got muddled in this discussion but as the chair understands it, the question now recurs on the adoption of the report as amended. Those in favor of the report will say aye. Opposed, no. Adopted.

Mr. Mount: I rise for information. Where are we at?

President: We adopted the report as amended, providing that we set apart \$600 to be used by the Board of Managers as an amendment to the report. That is the report that we added to it, that is the amended report, but it carries that part with it.

Mr. Rudge: I don't believe we understand what we are voting on.

President: I will state it. The committee made their report which has been read here. The amendment is to appropriate \$600 to be expended by the Board of Management in their discretion to assist the Secretary.

Mr. Rudge: Doesn't include anything but the Assistant Superintendent?

President: This adopts their report in regard to that feature of it. There being no objection the chairman, with the consent of the committee, would have the right to change it if he had made a mistake in transcribing it, and with that understanding we will proceed.

Is the Committee on Nominations ready to report?

#### REPORT OF COMMITTEE ON NOMINATIONS.

*To the President of the State Board of Agriculture:—*We, the Committee on Nominations, to whom was referred the list of names placed in nomination,

have carefully examined the same. After careful consideration as to the location, recommend the following names for election:

Chas. Mann. ....	Dawes County.
V. Arnold. ....	Richardson County.
S. C. Bassett. ....	Buffalo County.
W. A. Apperson. ....	Johnson County.
E. McIntyre. ....	Seward County.
W. R. Mellor. ....	Sherman County.
L. Morse. ....	Dundy County.
T. A. McKay. ....	Hamilton County.
Peter Younger. ....	Fillmore County.
G. W. Hervey. ....	Douglas County.
Jos. Roberts. ....	Dodge County.
W. Foster. ....	Lancaster County.
R. M. Wolcott. ....	Merrick County.
E. Q. Russell. ....	Washington County.
To fill vacancy, Cyrus Horton Furnas County.	

W. F. JOHNSON, *Chairman.*

D. E. C. LONG,

G. R. WILLIAMS,

J. WATSON RILEY,

W. C. CALEY.

Mr. Johnson: I move its adoption.

Mr. Mount: I move that the report be received and adopted. Carried.

President: What is your further pleasure?

Mr. Mount: It seems to me there ought to be a resolution adopted in regard to laws being passed by the incoming legislature. As I understand it they appealed from the laws in regard to the appropriation for county aid. There are a good many counties that have dropped out probably on that account. I think we should have a resolution, and I will make a motion now, that there be a committee of three appointed, consisting of the President, President of the Board of Managers, and the Secretary, to draft such laws as they may deem necessary, and present the same to the incoming legislature. To have the legislature enact such laws as they deem necessary. Anything that is good for all County Associations, let them adopt that too.

Mr. Taylor of Hitchcock County: As I understand, years ago we had a law requiring the County Commissioners to appropriate a certain amount for the county Fair, and two years ago they amended that, making it optional with the County Commissioners whether they appropriated it or not. Is that what your motion refers to? Now this committee is to draft a bill to present to the legislature. I would gladly second that motion. Motion adopted.

President: In years past it has been the custom to fix the time at which the election of officers should take place. I don't know whether the convention cares to do that or not.

Mr. Rudge: Have we had a report of all the committees?

President: There is a report on the premium list, and Mr. Bassett asked

me to pass it for a while, and he thought he would be able to be here soon after 11 o'clock.

Secretary Furnas: I have got some 100 that have been returned in the same way.

Mr. Harvey: That seems all right; the Secretary should report here at each annual meeting those outstanding warrants and the dates of them, and by a vote of this meeting, be cancelled.

President: There is a motion.

Mr.——: I move you we go now to the election of officers. Seconded. Carried.

### ELECTION OF OFFICERS.

Mr. Ewing called to the chair.

Chairman Ewing: What is your pleasure?

Mr. Hawes: I move that the chair appoint the necessary numbers of tellers, say three. On receiving a second the motion was carried.

Chairman: I will appoint as tellers, Mr. Cook, Mr. Mann and Mr. Taylor.

Mr. Hawes: I move you that the first ballot be informal.

Chairman: Is that the intention of the mover of this motion, that we ballot without any nomination? Motion that first ballot be informal, receiving a second, was carried.

Chairman: Shall we ballot by call of the Secretary?

Mr. Mount: In order to get the expression of any body, is to informally ballot by ballot.

Mr. Vance: I think from the experience we had yesterday that we would be benefited by the list of credentials. The Secretary has the names that have been referred to him, but unless somebody is here in person to represent the county as a delegate or president of the society or member of this State Board they are not entitled to vote, and the only way we can arrive at that is from the report of the Chairman on Credentials.

Mr. Mount: That matter can be arranged by the Secretary calling the roll, and as each one's name is called he can speak up and give his vote.

Chairman: I would state that the Chairman of the Credentials Committee has placed on the Secretary's stand the list of accredited delegates here. There is no motion before the body. It is suggested that this informal ballot, while there is no decision, should be in the usual way; or I suggest that you might have the names of the delegates called.

Mr. Mount: I made a motion that the accredited delegates as their names are called deposit their ballots. Seconded.

Chairman: A motion has been made and seconded, that we proceed to ballot, the Secretary calling the names of the delegates, and they deposit their ballots as their names are called. Adopted.

Secretary Furnas: The names of those members whose terms have expired will not be called, but the full report of the Committee on Credentials as delegates from their society.

Mr. Mellor: I ask for information. Is not a member still entitled to vote until this meeting expires?

Chairman: The new members have been elected, the list whose terms are expired now.

Mr. Mount: Their terms expired simply as officers, not as representatives from county societies.

Secretary Furnas: No, sir. What will you do with the regular members of the Board?

Mr. Vance: This matter was brought up and spoken of just now, and the chair has ruled that the members whose terms expired at the close of this meeting are entitled to a vote the same as they have had.

Secretary Furnas: If you do that you are calling a roll of members who are not members of this Board. Those whose terms have expired in 1904 have been superseded by the newly elected delegates.

Mr. Rudge: I would say that this discussion is all out of order. The Chairman has ruled on this, unless we appeal from the decision of the Chairman.

Secretary: The new Board has not been organized, they are elected for the ensuing year; until the completion of this organization the old Board holds.

Mr. Bassett: Two years ago I introduced a resolution as part of the record of this society, that the membership does not expire until the close of the meeting, and the officers of this society preside until the close of the meeting.

Mr. Furnas: Then we will not call the roll of the new members?

Chairman: The action of the body has been that the Secretary will call these delegates as have been accredited by the Credentials Committee, each member cast his ballot as his name is called.

Secretary Furnas: I call now the members whose terms expired now, and not the report of the Committee on Credentials.

Chairman: You call the members of the Board as constituted in 1903.

Mr. Mount: I ask a question for information. This vote that is being taken, is it to be taken by the entire representation of the different counties?

Chairman: It is the entire presentation previous before our election to fill the vacancies on the Board of Managers.

Mr. Mount: That is not the point. Is the vote to be participated by the representatives of the counties, or only by the Board of Managers?

Chairman: No, by the whole Board of Managers. So far as this election we just had filling these vacancies, it makes no one eligible to vote here unless he has it as representative of the county.

Mr. Hawes: I rise to a point of order. This thing has been decided by the Chairman. The question might arise whether people could live in one county and represent another county. There are some people in this convention to-day doing this, and I believe this Credential Committee should understand thoroughly whether that people who are claiming to represent these counties are actually from those counties. With that understanding I move you we proceed to ballot.

Mr.——: As I understand the report of the Committee on Credentials and this body has accepted it, is not that the official list?

Chairman: Yes, sir. You may call it from the premium list.

#### INFORMAL BALLOT.

For Mr. J. B. Dinsmore.....	28
For Mr. Mellor.....	20
For Mr. Younger.....	2
For Mr. Hervey.....	1
For Mr. Filley.....	1
For Mr. Ewing.....	1
	—

Total.....53

Chairman: You have heard the result of the informal ballot. What is your pleasure?

Mr. Mount: I move you that the vote be made final, and that Mr. Dinsmore be declared elected President of the Association. He has a majority of all votes cast.

Mr.——: I think it would be better to take a formal ballot, I think it would be more satisfactory.

Mr.——: I move you that we proceed to take a formal ballot on President. Receiving a second, same adopted.

Chairman: We will proceed by the call of the delegates to vote. The Secretary will call the roll.

#### FIRST FORMAL BALLOT.

For Mr. Dinsmore.....	27
For Mr. Mellor.....	26
For Mr. Ewing.....	1
For Mr. Younger.....	1
Blank.....	1
	—

Total.....56

Chairman: No candidate having received a majority of the ballots cast, we will proceed to take another ballot.

#### SECOND FORMAL BALLOT.

For Mr. Dinsmore.....	28
For Mr. Mellor.....	28
For Mr. Younger.....	1
	—

Total.....57

Mr. McIntyre: I move you that the candidates be excused from voting.

Chairman: We will have to proceed to another ballot.

#### THIRD FORMAL BALLOT.

For Mr. Dinsmore.....	27
For Mr. Mellor.....	31
	—

Total.....58

Chairman: Mr. Mellor having the majority of the ballots cast he is now declared elected for the ensuing year.

(Mr. Dinsmore here resumes the chair.)

President: The next thing in order will be the election of First Vice-President. Will you proceed by informal ballot or by nomination. A motion is in order.

Mr. Bassett: I move you that we proceed to nominate for First Vice-President. On receiving a second the motion was adopted.

Mr. Bassett: I would like to place in nomination for Vice-President Mr. Ewing of Franklin County for First Vice-President.

Chairman: Any other nominations?

Mr. Bassett: I move you that the rules be suspended, and that the Secretary be instructed to cast the vote of the Association for Mr. Ewing for First Vice-President. Adopted.

President: The next in order is the election of Second Vice-President.

Mr. Younger: I place in nomination Mr. Caley.

Mr. Mount: I move you that the rules be suspended and the Secretary be instructed to cast the ballot of the Association for Mr. Caley as Second Vice-President. Adopted.

President: The next in order is the election of a Treasurer to succeed Mr. McIntyre. Nominations are in order.

Mr.——: I move you that the rules be suspended and that the Secretary be instructed to cast the vote of this Society for Mr. McIntyre for Treasurer for the ensuing year. Carried.

President: The next thing in order is the nomination for Secretary.

Mr. Mount: I place in nomination Governor Furnas.

Mr. Filley: I move you that the rules be suspended and the President be instructed to cast the ballot of this Association for our old friend, Mr. Furnas. Seconded and carried.

Mr. McIntyre: I want to state in regard to the payment of \$6.00 to the members. I will get a list of names, but how shall I do as to taking their receipts?

President: I will take that as a receipt and issue a voucher. The Treasurer will take a receipt from each individual, and that will be used as a voucher.

We have a report that was delayed on account of Mr. Bassett, and we will ask that that Committee report at the present time.

Mr. Bassett: The report of this Committee contemplates some changes in the rules of the Board. If you have a premium list and will open it I will make it plain as to just what particular part of it.

President: As this report is of great deal of importance to the Board, please pay close attention.

#### REPORT OF COMMITTEE ON PREMIUM LIST.

Your committee on premium lists beg to submit the following report.  
(Reads report.)

Mr. Bassett: In order to facilitate matters, as it is late, I will take the privilege, as chairman of the Board, to move the adoption of this report.

President: Shall the report of this committee be considered paragraph by paragraph, or will you wait until you hear the whole report and adopt the whole?

Mr. Bassett: I move for the adoption of the paragraph on page 7 relating to the sale of live stock. Adopted.

Mr. Bassett: Under the head of stalls and pen amend to read "speed stalls 45," "cattle stalls 8." Your committee finds that the price should be raised. I move the adoption of the paragraph. Adopted.

At the bottom of said page, under the word same, insert the following, meaning not to exceed nine swine pen shall be—. That is recommended because the number of pens are limited. I move the adoption of the amendment. Adopted.

On page 8 after the word pens insert the following: The number of stalls and pens being limited they will be assigned in order of application, etc. I think that the man who first makes the entry should be the one to be first served.

President: It is not an uncommon thing for men to make entries and never show up on the grounds. I would say the one who first made application and paid for the stalls.

Mr. Bassett: What we are proposing to amend on page 8—stalls cannot be secured at any time. The fee must accompany the application. We add after the word "pen" that we say that the number of pens and stalls being limited. I take it you don't make your application unless you accompany it with your fee.

Mr. Russell: I understand that the application is made to the Superintendent of the different divisions.

President: The application goes to one office, and the entry fee to another. Those in favor of the adoption of the recommendation signify by saying aye. Contrary, no.

Mr. Hendershot: I am in favor of a little change in the program there. In awarding stalls, if I understand it, if I want all of barn No. 3 I can go to the Superintendent immediately after this meeting and pay for it. I don't think it is fair. It is class legislation. I believe that the little breeder with a few cows or horses has as much right as the expert showman who comes there to advertise and sell. I am in favor of receiving all entrances for the stalls with the fees paid up to thirty days of the opening of the Fair, and restricting the rules for these great men, and give them all the space they can spare them. Some big farms had a barn to themselves. Let us protect the man who produces his own stock. I now move you that we amend this resolution by instructing the Superintendents of these divisions to accept all applications, receive their fee and receipt for them, and notify them that their awards of stalls will be made thirty days before the Fair. You will have all your stalls filled.

Mr. Ewing: I want to inquire whether the limit of the barn,—

Mr. Bassett: I might say that as far as small breeders are concerned,

the Superintendent might reserve a few stalls, but surely a large breeder would want to know in advance what he could have.

My object is to have all the barns full, and at the same time not to exclude the ones that want to show. If you take a fine span of horses and have to put them in a cow stable it is not proper for them. These importers are all rich, but ought not to crowd out Nebraska breeders. My proposition that entries ought to be made thirty days in advance, and if the fees are paid and the stalls are engaged, and that man should not happen to come, there will be others who will want it.

President: I will ask Mr. Hervey was there any empty stalls in the horse barns last year?

Mr. Hervey: No, sir.

President: I am not aware whether there was a second to Mr. Hendershot's motion or not.

Mr. Rudge: I second that motion.

President: The motion of Mr. Hendershot has been seconded. The motion is that the Superintendent shall be required to receive applications for stalls and fees and receipt for the same, assigning the stalls thirty days prior to the Fair. Are you ready for the amendment?

Mr. Taylor: It seems to me that if a resolution of that kind was adopted we might find our stables would be nearly empty. People don't want to make their applications and let their money lay here until thirty days before the Fair. I believe we can get at that in some other way by not doing that. I don't believe I care to make an amendment to the motion, but I would rather he would formulate it in some other way if he could.

Motion put to a vote.

President: The chairman is of the opinion the motion is lost. So declared.

Mr. Bassett: On page 8 after the words "pen" insert the following, "the number of stalls and pens, they will be assigned in the order of application, etc."

Mr. ———: I claim this is class legislation. I am a hog man as well as a cattle man. You will allow an importer to come in here and take—

It is wrong to allow any one company or association to manipulate or run our State Fair. We have got to run the State Fair for the State of Nebraska. Let us protect our breeders in this state. I want the Superintendent to have full control of this barn and not let importers dictate to him what stalls we shall have. Receipt for the money and in thirty days you can have all you ask for, if we have got them to spare. I hope that this amendment will be carried, because it is of vital importance to this Fair.

Mr. ———: I still maintain that my stand on this is correct and should be supported.

Mr. Rudge: I think Mr. Hendershot should be supported. We ought to take and put up a temporary pen, if we did not get back half what the lumber and pen cost for the running of the stalls. I think he is about right. Let them make their application to the Superintendent of the department, and let him decide thirty days before the opening of the Fair how many



stalls he can assign. If he has got 300 stalls and 350 applications, let him cut them down to meet the number of stalls he has.

President: I wish to make a bald, bare-faced statement, that there are a great many who have found themselves without stalls, resident of Nebraska, who came two years without having rented a stall, then there were those who were crowded out by the large dairies.

Mr. Bassett: Would it help matters by placing a limit?

President: The question is upon the adoption of the report of the committee. Adopted.

Mr. Bassett: On page 13 under the head of duties of President insert the following: "He shall appoint a Superintendent of Concessions at a salary of not to exceed \$150, such Superintendent to give a guaranty bond of \$1,000 to be paid for by the State Board. All contracts for concessions to be approved and signed by the President."

The concessions have been for years, and perhaps since we had concessions, under the control of the President. The custom has been to appoint a Superintendent of Concessions who is to receive a per cent of the concessions. And then it was in the interest of the Superintendent of Concessions to secure as many contracts upon that ground. I think there was \$3,850 for concessions, and he received \$385. And while the Board desires to receive as much money as possible out of the concessions, and yet the class of concessions we ask to be barred is of that class we don't want, yet give us the most money. And in order to remove that entirely and this man might administer that office for a salary, they have proposed that he receive a salary instead of the per cent, and that it be solely under the control of the President to sign a contract and that he ought to give a bond.

Moved and seconded that the report be adopted.

Mr. Rudge: I don't believe you will be able to secure such a man as you want for \$150. Now it looks like a pretty big thing, but you have got to go and get somebody outside of this Board, some man that will give it not only one month's time but two or three month's time. You will find people will want concessions all the summer long. I think this ought to be this way, and I offer this as an amendment, that the salary of the Superintendent of Concessions be 10 per cent up to \$200, but not to exceed \$200. I say the salary should be \$200 instead of \$150.

Mr. Mellor: I see no reason for limiting the percentage. We of course might get a good faithful man to perform these duties, but in case that he did not secure but \$1,000 in concessions, we ought to have some incentive for him to work for the interest of this association.

President: It has been moved and seconded that the report of the committee be adopted by inserting the words \$200 in place of \$150. Are you ready for the amendment as amended. Carried.

Now those favoring the report as amended will signify same by saying aye; opposed, no. The report was adopted.

On page 14 under rule 26 I have struck out the word provided (here Mr. Bassett reads.) The committee are in doubt that if that classifica-

tion is continued a man shall elect whether he is going to show in open competition or have Nebraska bred animals only.

Mr. Hendershot: I move to strike from our records this class altogether for this reason. Our national associations, most all of them, offer a consolation prize, and if we are not big enough in Nebraska to come out and stand up against the world, probably we had better stay at home. If we get a creditable exhibit we can bring it, and if we don't get a place on the program as expert showmen we will certainly go to——.

I move you as an amendment we strike out this premium and insert instead, make three places on our premium list for money and the fourth place being highly commended.

Mr. Russell: The State Swine Breeders' Association passed a resolution.

Mr. Bassett: I saw your committee recommendations that we strike out rule 26 so far as it relates to swine, but not having heard from the cattle or sheep men, we left it that way.

Chairman: Was there a second to the amendment? A. Yes, sir.

Mr. Filley: Mr. Hendershot is a professional breeder. I want to say to you and this Board that we have got cattle in Nebraska and they are building up their herds, but they are afraid to come out against those farm herds that come in here and clean up the platter, and we put that in and I came for the purpose to encourage and get our Nebraska bred animals in the ring. And I want to say to you that the means of bringing out my friend Riley, they come down here with as fine cattle as ever was shown on the ground, and now then there are other men back who want to come down here with their cattle. If Mr. Hendershot prevails they will stay at home because they will not come up against this big herd of cattle. In this amendment that Mr. Bassett has just read, is that he shall elect when he makes his entry, and when he brings his cattle on the grounds where he is going, whether against these professional fellows or against the Nebraska bred animals, does not make any more expense.

President: The report of the committee provides for the election of the expert, whether he shows in the open competition, or he shows in the Nebraska competition. The amendment of Mr. Hendershot that we strike out the clause entirely tends to make a third premium.

Mr. Hervey of Douglas: I am opposed to the amendment of striking out entirely this clause of Nebraska bred animals. I would like to see it to see knocked out because I contend that I am able to come into competition with the Nebraska breeders but not the outside breeders. But I would not take one of my cows and attempt to go into competition with one these fellows show for the value of the cow. As soon as you feed up an animal as fat as they are, they are not fit for breeders.

Mr.——: As mover of the motion I will accept the amendment as made by Mr. Russell.

Mr. Russell: I didn't offer an amendment.

President: I think it has been pretty well discussed. The motion recurs upon the amendment offered by Mr. Hendershot, that we strike out the

Nebraska bred classification, using the money to make the premium in the fourth class. Motion lost.

Now it recurs upon the adoption of the report of the committee. Adopted.

Mr. Bassett: On page 15 where 40 before the word animal, insert the words "all matured animals." (Mr. Bassett here reads). Adopted.

Mr. Bassett: On page 26 strike out 21 that relates to stallion horses. Adopted.

Mr. Bassett: Class 3 on the recommendation of the swine men, we have stricken it all about Nebraska bred animals, etc. I move the adoption. Carried.

Professor Bessey is with us and is on this program to give us a short speech upon the topic of the Botanic Gardens that he has seen abroad.

Prof. Bessey: (Here Prof. Bessey stated to the reporter that he would furnish a manuscript of his remarks.

### SOME FOREIGN BOTANICAL GARDENS AND PARKS.\*

BY CHARLES E. BESSEY.

*Gentlemen of the Nebraska State Board of Agriculture and the Affiliated Societies:* Last summer I had the privilege of visiting a number of botanical gardens and parks in different parts of Europe. The American visitor abroad is constantly reminded of the abundance of parks and botanical gardens in not only the larger cities but even in the small cities and towns. In London, Hyde Park is a great tract of land, at least a mile and a half in length and from one-half to three-quarters of a mile in width, situated in the heart of the city. It contains in the neighborhood of 600 acres. Some portions of it are heavily covered with trees and shrubs, others are sparsely covered with trees, and still other portions again consist of greensward without shrubs or trees. Here and there are often beds and masses of ornamental flowering plants. Walks and drives are provided at frequent intervals. In some places the people are kept from walking upon the grass, while in other places they are permitted to use the ground very freely. I saw boys and girls of all ages playing as freely in this park as they do in the fields and public places in this country. Not far from this park is a smaller one, Regent's Park, nearly circular in shape, and containing about thirty acres. This is considerably more ornamental, and apparently the public cannot use the ground as freely as in Hyde Park. St. Jame's Park and Green Park are two much smaller parks together aggregating perhaps one hundred acres. These are not far from Buckingham Palace, the residence of the King, and are situated in a very densely settled portion of the city. Here the children of all ages gambol about on the ground without any fear whatever from the police. In fact it seems that to a very large extent these London parks are for the benefit of the people.

When we consider that there are here in the heart of London nearly or perhaps quite 1,000 acres of land set apart for park purposes we may realize how fully the people of that great city believe in open places for the benefit of the women and children and the tired men. These parks if cut up into

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\*Stenographic report of an oral address.

lots and sold would bring almost fabulous amounts of money. How it has happened that the real estate agent has been kept from laying his grimy hands upon these open places is more than I can tell. These parks if sold for building purposes would yield hundreds of millions of dollars, and yet the sturdy Englishmen would resent most fiercely any attempt to restrict or reduce their area.

Now add to these parks in the heart of the city the many parks in the suburbs, Richmond Park, Wimbledon, Kew, Chiswick, etc., etc., aggregating perhaps 2,500 to 3,000 acres, and we have some idea of what the great English city has done for its people.

But this is not all. In the suburb called Kew are the Royal Botanical Gardens, known the world over as the Kew Gardens. Here on an area as large as a Nebraska farm are gathered all of the plants which can be made to grow under the care of the most skillful gardeners to be found in the kingdom. Here in the great Arboretum one may walk through a forest which if not primeval is as dense and wild as the primeval forest itself. Here one may find trees brought from America, from distant parts of Europe, from Asia, from India, and from Africa. Here are grown in profusion shrubs of all kinds from all climates, and here under glass where the temperature and the moisture conditions are made to imitate as closely as possible the different climates, may be found tens of thousands of species of trees and shrubs and herbaceous plants, all labelled and named so that "he who runs may read." Here daily, thousands of people walk through the great grounds finding at once recreation and instruction. Who can measure the value of these great gardens to the people who live in London itself.

Add now to this the fact that from all parts of the world scientific men come to study the collections of plants which are brought together in the Kew Gardens. It is the Mecca of botanists the world over, and to this place sooner or later every systematic botanist must come in order to study the great treasures which for a century or two have been gathering in this place.

In Berlin, the capital of Germany, an area of probably 500 acres is set aside under the name of the "Thiergarten," and here again as in London the people swarm day and night, walking through the paths under the shade of the great trees, lingering by the beautiful shrubbery and admiring the great beds of fine flowering plants. Here are found at intervals, monuments, statues, and other architectural structures which commemorate the great deeds of the German people,—a tribute to the feeling of patriotism which is so prominent in the Fatherland. A mile away are the old botanical gardens, still in the densely built up portion of the city. Thirty or forty acres of ground are set apart here for trees and shrubs and plant-houses. Here I saw the greatest collection of cactuses to be found any place in the world. Although the cactuses are American plants it is true that if one wishes to study thoroughly these plants of America one can do so best by going to Berlin and making use of this unrivalled collection of living, growing plants. But this old garden has proved to be entirely too small, and within the last few years at the little suburb of Dahlem on the southwest edge of the city the government has set apart about 150 acres of land, and here a new botani-

cal garden has been installed. Here one may even now find plants of all kinds from all countries and all climates. Here the government has erected fine office and laboratory buildings, and at the time of my visit the great plant-houses were just being enclosed. When the work is completed this will rival the Royal Gardens at Kew.

In Vienna, although the city is an ancient one; those in authority have seen to it that there are great areas left vacant for breathing places for the public. One afternoon I visited the great Prater Park on the edge of the city, three miles long and from one-third to a half a mile in width. Here are from 600 to 800 acres of land, some of it open, forming meadows on which the children play, some of it in very dense forests, some of it covered with shrubs. Some portions of it have been treated very carefully with the best development of landscape effects, while others have been allowed to remain in as nearly as possible a natural state. I saw at least 50,000 people at the time of my visit, and as I looked over the great crowds that had flocked here for recreation and rest, I questioned whether the number was not double this. What a park of this kind means to the great city I have not time here to discuss. It means at least life and health and enjoyment for tens of thousands, yes hundreds of thousands, of women and children and tired men.

Away across Central Europe into the land of the Czar is the old city of Moscow, the old capital city of all the Russias. Here I found a botanical garden belonging to the Agricultural Institute which rivals anything to be found in America. The garden includes not only a great Arboretum in which trees from all parts of the temperate portions of the world are grown, but in addition, the garden proper, where plots of herbaceous plants representing many of the botanical groups, are planted and carefully studied. In connection with this garden is a large farm with fine buildings and modern improvements. Both garden and farm seem to be maintained for the purpose of instructing the people. Visitors are welcome here and the object-lesson which is before them cannot fail to be very beneficial to the farmers and the gardeners of this portion of Russia.

Now go south across the great Steppes to the northern slopes of the Caucasus Mountains. We leave the great cities of Europe and find ourselves in the region where there are only small cities, and towns of moderate size. We stop at Kislovodsk in the foothills on the northerly slope of the mountains. Here is a town of about 6,000 inhabitants. It lies along the banks of the Kuma River which flows down from the snowy summits of the mountains. Yet in this little city there is a fine old park, not situated as we might suppose, on the outskirts where the land is cheap, but in the very heart of the city. Here are perhaps 100 acres of land covered with trees most of which have been planted, and filled with paths and booths, public halls and playgrounds, and running through it is the roaring stream which adds greatly to the charm of the place. Here every night one may listen to the music furnished by one of the military bands. It is a cool, peaceful, restful place, and as one thinks that all this is in a little town in an out of the way corner of the world, he cannot help wishing that his own people in this enlightened land esteemed such things as highly as do these people.

At Vladikavkaz, a city a little smaller than Lincoln, lying at the north end of the great military road which crosses the mountains through Dariel Pass, I found a city lying on a level plain. The city was founded by one of the former rulers of Russia for the purpose of guarding this pass, and yet here I found that the principal street was in the form of a delightful avenue. Down the center of the street had been planted a double row of trees and between these an elevated walk had been built. This walk is perhaps two feet above the level of the street on each side, and is twenty or twenty-five feet in width. On a hot day one may imagine how pleasant it is to walk down this avenue under the shade of the overhanging trees, and as the evening coolness comes on this becomes still more attractive. At frequent intervals comfortable seats have been provided, and here the tired people come out and rest for an hour or two every evening. Here the children play, running back and forth as children will. But this is not all. At the side of this same avenue are the city gardens covering from fifty to sixty or seventy acres. One enters these gardens as he would the private grounds of some wealthy owner in this country, but after entering he finds himself in a shady park. The portion of the park nearest the street has been set aside for the children, and here are provided many games, swings, and similar things for their enjoyment. This portion of the garden is always full of the voices and the chatter of happy children. Further on are statues, and ponds, and fountains, and here from time to time there are music and other means for enjoyment and recreation. Remember that this is in a far away Russian city which was built not for beauty but through military necessity. Here, if any place in the world, such things as parks and gardens might well be forgotten, but here we found parks and gardens which are more attractive than any that I know of in a city of equal size in this country.

Now cross the great mountain range and in the dry and parched country of Transcaucasia, to the banks of the Kura River, and the city of Tiflis. The rainfall here is not to exceed twenty inches a year and the soil is for the most part very sandy, and yet in this city of about the size of Omaha are found large parks for the benefit of the people. Alexander Park, covering perhaps twenty acres, lies in the heart of the city. All around it is the bustling, hurrying crowd of men and women engaged in trade, and inside of the park are trees, flowers, fountains, pools, statuary. Here are grounds on which children may play. Here every night one may hear good music. Here are seats for tired people, here in fact are all the things that contribute to the enjoyment of people day and night.

On the north side of the city a new park has been recently laid out for the benefit of the inhabitants of that portion of the town. In connection with the new park are gardens for the acclimatization of plants and for other economic purposes. I know of nothing like this in any city in this country excepting New York and St. Louis.

At the south end of the city are the Botanical Gardens of Tiflis. Here are gathered trees and shrubs and flowers as well as rare plants, including palms and ferns and bamboos. While open to the public under certain restrictions, this is not intended as a public park in the ordinary sense, yet those who

enter the grounds find here all kinds of plants labeled correctly, so that those who visit may receive instruction. Perhaps ten to fifteen thousand different species of plants are grown out of doors on these interesting grounds. Then there are plant-houses, libraries, and collections of preserved botanical material. I was very much surprised at the magnitude of the work which was under way in this botanical garden, and yet it must be remembered that this is all in connection with a city no larger than our own metropolis of Omaha.

Still further south 100 miles or more, on the plains of Southern Armenia, under the shadow of Mt. Ararat, is the little city of Erivan containing about 30,000 people. It lies on the hot and dusty plains in the immediate vicinity of the great mountain. The rainfall is probably not to exceed ten inches a year. On the edge of the city runs the river Zenga which flows from a mountain lake, Lake Gokschai, many miles northeastward. Nothing will grow here except under irrigation. The land is a dry and parched one, and yet in this city of Armenians, Turks, Grusians, and other non-European types, we found in the center of the business portion, a park of considerable dimensions. It is true that it was not as beautiful a park as many that were visited, but a park in a region of but ten inches of rainfall cannot rival the parks in London; yet here was valuable land set aside for this purpose. Around the park were gathered the hotels and the larger business houses. Through the park there ran the irrigating ditches and here were provided walks and seats in abundance, and at night electric lights and music, and here the people at the end of hot days gathered to talk, to chat, to walk up and down, and to listen to the music.

At Batum, a city of 30,000 people, lying at the east end of the Black Sea, and until twenty-five years ago a Turkish city, we found another park which might well be envied by any American city of equal size. Although so recently wrested from the Turk, the city has made much progress in the development of its parks. We found one portion to include many trees which we had not yet seen, and these trees are not confined to the region alone. We found many American trees growing luxuriantly in the parks, showing that the managers were men of education and broad training, and here too we found to our delight a botanical garden with hundreds of trees both native and foreign all named in such plain way that the ordinary visitor might gain much valuable information in regard to them. Again we found walks, and pools, and statues, and seats, all contributing to the comfort and enjoyment of the many visitors.

Crossing the Black Sea from the east end to the west end, we reached the great mercantile city of Odessa with its half million people. Here one might well excuse the people for not giving attention to things like parks and botanical gardens, for this is the great mercantile city of Russia, and it lies on a sandy, gravelly shore of the sea, and is watered by but very little annual rainfall, and yet along the sea front is a fine boulevard with walks and playgrounds and here children and the tired mothers gather day and night. A short distance away, and connected with it, is Alexander Park, of about 100 acres with a dense growth of forest trees and under-shrubs, and here

again as before, seats and other conveniences are abundantly provided. One cannot go through these foreign parks without having it impressed upon him that the purpose of the park is to provide resting places and playgrounds for the tired people, while at the same time adding to the element of beauty. Further down the coast in the suburbs of the city we found a row of parks, and here to our delight, we found also a botanical garden where the government under the direction of the University is introducing large numbers of foreign plants, and labelling them so that those who visit the grounds may be instructed as well as amused.

I need go no further in my illustrations. What I have said of the parks of these cities has been simply to bring the matter before you in order to emphasize the fact that in the cities abroad the making of parks and gardens is looked upon as one of the necessary things in every city. In America we ought to imitate this good habit. It is true that in this country our largest cities have parks, but to a very great extent they are situated in the suburbs alone, and the very people who should have the opportunity of getting to them, never reach them, and our smaller cities generally have no parks at all, and when we come to our towns and villages what can we say? There are no places for the children and the women and the tired people generally.

Coming now to our own city of Lincoln, a city which has many things about it which are very attractive, one is made to drop his head in shame that we have no parks. It is true that four blocks of land, between D and F and 6th and 8th streets were originally set apart and labelled "City Park," but this is scarcely more than a "common," for here cattle and horses and swine are permitted to roam at large. For years this has been a reproach to the city. All that is good in it we owe to the private efforts of the public spirited women of the city, and yet year by year their efforts have been largely negatived by the utter lack of public spirit shown by our officials. This little tract of land was not fitted by nature for park purposes, and yet it has been made less useful by its absolute neglect.

We must preach a reformation. It is not to our credit that this city has no breathing place in it. We must have not one alone, but several public grounds where children may play, where people may gather, where they may sit and rest in the cool of the evenings of the hot days of summer. Why can we not set aside in the Antelope Valley a tract of land on which we may erect a proper Lincoln Park worthy of our city? Such a park would be central; such a park could be visited by the great majority of the people of the city. Is it not worth our while to consider matters of this kind?

Finally, is it too much to hope that within a short time the University may establish a botanical garden where may be gathered all of the native plants of the state, all of the plants which may be made to grow in this region, where every plant grown shall be labelled so that the visitor as he passes through the garden may learn not only the name but the history of the plant as well. Such a garden may be a place of beauty and of interest and at the same time it may have a high educational value for the people of the state.



President: Prof. Burnett will make a few remarks.

Prof. Burnett: I want to explain before offering this resolution the purpose. I think you appreciate by this time the fact, the many things which we are endeavoring to do in the experiment station, taxes the resources available and limit the operations which we are able to carry on; that the money available for work is too small. Now there has been introduced in congress a bill which provides that the next Congress shall give an additional appropriation to the experiment stations of the several states, beginning with \$5,000 to each experiment station for the first year, and increasing by \$2,000 each year for five years, until this sum shall reach \$15,000, a sum equal to the amount now given by the United States government for the experiment station. The resolution I wish to introduce, is this:

*Resolved*, That we, the members of organized agriculture, and the several agriculture societies of Nebraska, indorse House Roll No. 8——, providing for an increased appropriation by the Congress of the United States for the aid of the experiment stations established in the several states under an act of Congress approved March 2d, 1887, known as the Hatch Act.

*Resolved*, That a copy of this resolution be sent to each member of Congress from Nebraska.

I move the adoption of that resolution. Adopted.

Prof. Henry: Include the chairman of the committee on agriculture of the House.

———: Would be glad to do so.

President: Is there anything further to come before the meeting, if not, we will consider ourselves adjourned for the evening.

#### FIFTH SESSION.

CHAPEL, MEMORIAL HALL, UNIVERSITY OF NEBRASKA,

Lincoln, 8 p. m., January 21, 1904.

Evening meeting called to order by Prof. T. L. Lyon, who presided:

We will be favored this evening by a musical selection by Miss Flossie DeArnold.

Prof. Lyon: Of the many branches of agriculture that which treats of the soil is the most important; it is the most important because it is at the foundation of all agricultural prosperity. Without a fertile soil, and without a soil capable of producing large yields, well bred crops and well bred live stock are practically useless. There are certain reasons why the subject of soil fertility is of peculiar interest to Nebraska. One reason is because we have here a soil that is practically new, a soil that has not been depleted or sufficiently depleted so that it will be difficult to bring it back to a state of high productiveness. It is still in a condition where it is possible, with a comparatively small outlay of time and money to keep it in a perfect crop-producing condition.

Another reason why Nebraska is peculiarly interested in this subject, is because there are certain conditions of the soil and certain conditions of the climate in parts of this state, that would make it a difficult matter to recover that fertility if it were once lost. The matter of incorporating barnyard

manure in our soil, to get it to decompose properly and with sufficient rapidity with the amount of moisture on hand, is a subject that requires a great deal of study and a great deal of research. We are fortunate this evening in having with us some one who has made a deep study of this matter, in fact, whose investigations along the line of soil production, are becoming classic.

I have the pleasure of introducing to you this evening Prof. C. G. Hopkins of the University of Illinois, who will address you on

### THE PERMANENT MAINTENANCE OF THE PRODUCTIVE CAPACITY OF THE SOIL.

Prof. C. G. Hopkins: Ladies and Gentlemen: If there is any one thing which farmers know better than anything else, I think it is that there are differences in soils. All soils are not alike; they do not have the same productive power. We all recognize that there are different physical conditions in soils. Some have better drainage facilities than others; some are hard and compact and almost impervious to plant roots, while others are loose and friable and more readily penetrated. But we recognize still further, that a given soil may be highly productive in its virgin state, and in later years, after half a century of cropping, we note that its productive capacity is very markedly reduced. We all recognize these conditions. But it is evident that such conditions were also recognized 4,000 years ago. At the time when Lot separated from Abraham, you remember that Lot chose the well watered plain, and Abraham took what was left. Lot recognized the fertility of the soil, and I am free to say that during my early life on the farm, I don't believe that I knew anything more about the fertility of the soil than Lot and Abraham knew. I just simply raised crops. Perhaps I used better tools in cultivating, but I went on plowing the ground and sowed the seed and took what came, just as my father and grandfather had done before me. And I believe we are doing that yet here in the great Central West. We do not recognize such a thing as plant food, certainly not as much as that subject deserves. I have here a chart which shows the quantities of certain elements of plant food contained in a number of the important farm crops

It is well known that there are 10 essential elements required to grow crops. And in my talk this evening, I shall assume that I am talking to Nebraska farmers and not simply to the University men who are here at Lincoln; and I shall assume that you have not spent very many years in studying the chemistry of the soil any more than I did when I lived on the farm for more than 20 years. So if I stop to explain what I mean by an element or any other terms that it may be necessary to use, I hope those that are familiar with these things will pardon me; for there are those here who have studied this subject for years.

By the term element, we mean a substance which can not be divided into two different things. I can illustrate perhaps as well by the ear of corn as with anything. We take an ear of corn and we can readily divide it into grain and cob. That tells us at once that the ear of corn is not an ele-

ment, because an element cannot be divided into two different things. We take the kernel of corn, and we can divide it into protein, carbohydrates, oil, and mineral matter. There we have four different things from the kernel of corn. Consequently that is not an element. We can take one of these materials, that we get from the grain, say, carbohydrates, and we divide it into starches, sugars, as glucose, dextrose, gums, pentosans and other substances.

Let us consider one of these materials we get from carbohydrates. Starch is one of the carbohydrates. We can divide starch into carbon and hydrogen and oxygen, consequently starch is not an element. But now we are at the end of our process of dividing. Carbon and hydrogen and oxygen are elements. We know that carbon, for example, is an element, because we cannot take carbon and divide it into two things. We cannot take hydrogen and divide that into two different things. That is impossible. That is what is meant by an element.

Now there are ten elements required for growing crops. Three of them—these three that I have mentioned—carbon, hydrogen and oxygen, are supplied by nature in abundance. The element carbon comes from the atmosphere, where it is present in the form of a compound called carbon dioxid. Now that may be rather a new term to some people, but it is really a simple term. I think you would know exactly what it is simply from the name carbon dioxid. You know there is an element carbon and an element oxygen, and then you know what the compound is, because “di” simply means two, and you see there is the complete name carbon dioxid. It is a compound of the two elements and contains one part of carbon and two parts of oxygen, and this is the simplest name we can use for it.

This element carbon is contained in the carbon dioxid in the air in the form of gas. I want to take just a moment to explain how that is possible. We have some of the element carbon here. It is a black solid substance in its commonest form, and it is not very easy perhaps to discover or understand how this material can be in the air, in the form of colorless gas, but you know if you take this element carbon, which is well represented by charcoal—ordinary coal is nearly all carbon—if you take that and heat it to a high temperature it begins to glow and it finally disappears. In doing that it simply unites with the element oxygen in the air and forms the compound carbon dioxid, which is also a gas. We see things change from one form to another very frequently in nature, and it is not very strange. Here we have another element, sulphur, a yellow solid substance. Now, there are two elements, carbon and sulphur, with which you are very familiar. We can change both of them to gaseous forms if we let them unite with the oxygen in the air. This sulphur unites with two parts of oxygen, and you will know at once what the name should be of the compound thus formed: namely, sulphur dioxid. These two elements, carbon and sulphur, unite one with the other and make a compound, and that compound any one ought to be able to name just from the names of the elements. The compound of sulphur and carbon is carbon disulfid, and contains one atom of carbon and two of sulphur. This compound is a colorless liquid. Yet it contains ab-

solutely nothing except these two elements. These elements individually, each by itself, are solids, but when they unite they form a compound of the two elements, a compound that contains nothing but these two elements, and yet it is a liquid. We can divide that liquid into these two elements and get the solids out again. It is no more strange than what occurs in the stove or furnace. You throw in 25 pounds of coal and 60 pounds of oxygen enters the vent and about 85 pounds of the gas, carbon dioxide, goes off through the chimney. When you examine the stove half an hour later there is only a pound of ashes left.

The two elements, hydrogen and oxygen, are contained in water. Water is simply a compound of these two gases, hydrogen and oxygen, and they are carried into the plant in the form of water. The plants absorb hydrogen and oxygen through the roots and carbon and oxygen through their leaves, and thus we supply to the plants these three elements. They make up from 90 to 95 per cent of the total dry weight of ordinary agricultural plants. These three elements make up 90 to 95 per cent of every ton of hay or corn. They differ somewhat in different crops; they make up a large proportion of every crop.

There are four other elements which do not need much consideration. One is sulphur which I have spoken of. Another is iron, and the other two are calcium and magnesium. We do not need to consider those elements because they are required by plants in very small amounts, and they are present in nearly all soils in comparatively large quantities. There is probably enough iron in the ordinary Nebraska soil to grow several hundred thousand maximum crops of grain. We do not need to worry about it. The plants require a mere trace of it, and there are tons of it available. We cannot conceive of its ever becoming deficient in the soil.

But there are three other elements to which we ought to give attention, and these are those to which I refer in the tabular statements—nitrogen, phosphorus, and potassium.

This matter of feeding plants is simpler than feeding live stock. These three elements are present in nearly all soils in limited amounts, but they are required by agricultural plants in very considerable quantities. When we put these two facts together you will see that if we remove crops year after year, we keep removing these elements, and if we have a limited stock to draw from, ultimately our soil reaches a point where it cannot give up to the growing crops enough of some one of these elements to grow maximum crops, and then our crop yields begin to be reduced.

Just how much of these different elements we should have in the soil we do not know absolutely as yet. We know that they are present in soils in a form which is not very soluble, and we know we cannot get all of them out in one season, indeed we liberate only a rather small per cent under the best cultivation we can give. I have estimated roughly that we can get out 2 per cent of the nitrogen in plowed soil in one season. I think that perhaps is rather high, but if we could do that; that is if we could take out 2 per cent every year from the original amount, about 50 years would take it all. Of the other elements, phosphorus and potassium, we cannot get them

out so rapidly, and probably one per cent of the amount in the plowed soil would be about the measure for these, roughly estimated, but even that if we could take each year one per cent of the original amount, would remove all there is in the plowed soil in 100 years. You will see from the tabular statements that there is not enough of some elements in these soils to grow 100 crops.

I want to take a moment's time to speak of one of the elements in somewhat greater detail. The element of nitrogen, one of these two elements which is a gas, it is contained in the air, and we get it from the air by means of leguminous crops, such as alfalfa. I do not have any nitrogen to show you and hardly need to do that perhaps. It is present with us all the time. Four-fifths of the atmosphere is nitrogen. The crops cannot use this element, nitrogen, in the free state, any more than they can the element carbon in the free state. We must change solid carbon to the form of gas before plants can use it. So the element of nitrogen, which is a gas in the free state must be changed to the form of a soluble compound. The element phosphorus also cannot be used in the free state, it must unite with some other elements before plants can take it up, and that is also true with the element potassium. Each one of these elements is essential to plant growth, as the piston rod is to the movement of a railway locomotive. You may have a locomotive that is all complete, but you leave off the piston rod and there is no movement; the train stands still. And so it is just as essential to plant growth that the plant should have every one of these elements, otherwise it does not grow.

This element, potassium, in the free state is a metallic substance, somewhat like lead (*the speaker showed samples*). As I cut it, it gives a bright surface. Plants cannot use it in this state. It must be united with other elements. If we were to put this in the roots of the plants it would instantly destroy them, indeed it would take fire in a moment, because it has such an attraction for other elements, especially for the oxygen and hydrogen in water. If I drop this piece in the glass of water here, it will immediately take fire, uniting with the hydrogen and oxygen contained in the water, and forming a compound with those two elements. (*The experiment was performed*). Here we have the transformation of an element from the free state over to the form of a compound. Now, I put in quite a piece of that substance, but it is gone, you see—destroyed apparently, it has really united with the hydrogen and oxygen. Potassium united with hydrogen and oxygen? You know what it ought to be called. It is potassium hydride. We get enough of the names of all of these elements to show what it is—what elements it contains. There are so few of these elements that we use in daily life that we can know about them.

(Here the speaker performed some experiments for a few minutes with different elements. After which he entered into a general discussion pertaining to the different soils, illustrated by charts and maps which were on the stage, which it was impracticable for the reporter to make a suitable report of. Prof. Hopkins promised to send printed data bearing on the subject.)

Chairman: I should like to add that the drift soils that are characteristic of the extreme eastern part of the state of Nebraska are quite deficient in the element phosphorus, and that on these soils particularly, the remark that the Professor has made this evening, and the deductions that he has drawn from his experiments, are particularly applicable. Through the eastern and southern part of the state, this element phosphorus is much needed in soils that have been farmed for a considerable time. Our soil analyses made by the agricultural chemical department in the University, show that of these three elements, nitrogen, phosphorus, and potassium, the phosphorus is the one that is most deficient.

Regent Whitmore: It is not often, as you know, that we have as representative a body of farmers with us as we have here tonight, and there was one suggestion Prof. Hamilton made, that I don't believe the farmers of Nebraska can afford to lose sight of just at this time, and that is the Illinois idea, that when the farmers want anything they will make it known and go after it. Now, we who have lived in Nebraska, and had interest enough in the state for the last 25 years, know that up to a very recent period it has always invariably been the case, that every appropriation that has been sought for from our legislature, especially for the school of agriculture, has had to be drummed up by the regents, the chancellor and the faculty here in the State University. I have been utterly surprised at the seeming indifference on the part of the rank and file of the farmers of this state to their interests in educational matters. Now as one of the incoming regents, and especially as the only farmer regent on the board, I anticipate that in future years the farmers of this state are not only going to know more about our school, but they are going to be more interested in it, and I sincerely hope that from this time on the farmers will see to it that the work of getting appropriations from our legislature for our school of agriculture in particular, will not devolve so heavily as it has in the past on the chancellor and the faculty of the University. I believe we ought to make it our business from this time on to see that our legislators are elected on these issues, and that we get more nearly what we are entitled to in the way of appropriations for our school of agriculture.

I wish that the farmers of this state could take a trip over into Minnesota and Iowa, Illinois and Wisconsin, and look and see what the farmers there are doing in the way of agricultural education. There is no reason in God's world why from this time on Nebraska should take a back seat for any of these states in the matter of agricultural education. (Applause.)

#### FOURTH SESSION—Evening, 8 O'clock.

##### University Chapel, Memorial Hall.

President Dinsmore: The hour for this meeting having arrived you will come to order. You will pardon me if I introduce something here that is not on the program, but which I am certain will give you pleasure. We have with us tonight a gentleman who pleased audiences by his rich melodious voice before many of you came to this state, and possibly before

many of you had thought of Nebraska as a state. We have with us Mr. Jules Lombard, who will favor us with a song. (Applause.)

Prof. Lombard: Ladies and Gentlemen: It is not a pleasant thing to have to put your worst foot forward first in any public performance, for I am here without any rehearsal, without any music, without any accompaniment, and must sing something that is simple, the song entitled, "Are You Sleeping, Maggie?" and if you will put up with that I will try and render that for you.

I think I sang it a year ago at a meeting, and I made about the same pretensions as I do now, and I will take the chances of repeating myself. I had occasion three or four years ago to attend a dairymen's convention at Mason City, Iowa and Mr. —, who published the Creamery Journal at Waterloo, a very warm personal friend of mine, in giving an account of the meeting, referred to my singing there, and said in response to the encore he sang "Are you Sleeping, Maggie?" The fact is I have sung this song for 50 years, really without having a competitor, for I have never heard anybody sing it. It is a song to the memory of the old Scot who goes to see his lassie. Later in the evening after the old folks have retired, he makes his presence known to her by singing this song. (Applause.)

In response to an encore he sang an old Scottish song entitled "Loch Haven."

President Dinsmore: Ladies and Gentlemen: We are fortunate in having with us tonight a gentleman that I think I am not flattering when I say that he is the foremost agricultural educator in the world, a man who has done more to uplift the agricultural pursuits in this country than perhaps any other one man, possibly more than any other dozen men, a man whose name is known throughout the length and breadth of this land, only to be admired and loved for the work he has done, for the strength he has put into the investigation that enables the agriculturist to reap a better harvest from his labors, and to lift up and dignify his calling, and whose name is known throughout all the foreign countries wherever there has been an effort made to lift up and broaden and strengthen agricultural pursuits. Prof. Henry of the Agricultural College of Wisconsin is here, and will now address you. (Applause.)

ADDRESS BY W. A. HENRY,

Dean of Agriculture and Director Agricultural Experiment Station, University of Wisconsin, Madison.

Mr. President, Ladies and Gentlemen, Members of the Numerous Agricultural Societies, and especially Agricultural Students of the University of Nebraska: I bring you welcome from the far away Badger state tonight. It is a little colder in the region where I live than down this way, but I assure you our hearts are just as warm in our support and regard for neighboring states as are your own. The agriculture of Wisconsin is advancing steadily. I come here tonight to receive inspiration and help from your great state, and if I can say a few words that will help you on in your good work, I am sure we all will rejoice.

Now it happens that even in this world men who do much of the real work of life cannot talk very well. I think you have had illustrations of this in your own neighborhood and among your own friends, that the best talkers are not always the best workers, and sometimes the other way. Perhaps when I am through you will think that I may be a good worker, but you are quite certain I am not a good talker and cannot hold an audience. Let me tell you first of all a little story on Governor Hoard and myself. I began my institute work in Wisconsin twenty odd years ago. One of my early associates was our honored and beloved ex-Governor W. D. Hoard. Another co-worker was Henry C. Adams, who is now a most able Representative in Congress from our district—one who is working all the time to advance agriculture. Now Adams delights in telling this story on Hoard and myself. He says that on one occasion we all three went out in the country to hold a meeting with the farmers. We arrived at the hall in due time and at once proceeded to occupy the platform,—all three of us,—and to talk. He affirms that Hoard talked and talked for about an hour and a half, and then it came Henry's turn; that Henry got up and talked and talked. Down on the floor occupying the middle of the room, Adams declares, sat one lone man, and that Hoard and Henry both did all their talking to that one man. Adams affirms that as I stopped to catch my breath, after a long round, the lone man in the audience spoke up, saying, "Be you fellows about through?" I said, "We are." He replied, "Well I hope so, for I am the janitor, and I would like to lock up and go home."

I hardly expect to hear from the janitor tonight, but perhaps before I am through you all will have left the room to the janitor and myself.

Let me tell you first of all, farmers and students, something concerning the origin of our agricultural colleges. The man to whom of all others the agricultural college movement is to be credited, was Justin S. Morrill, of Vermont. While in the Lower House of Congress he secured the passage of an act in 1858 by which the general government set aside a large area of the public lands for the endowment and maintenance of industrial colleges. For reasons which I cannot here stop to explain but which were not educational, James Buchanan, then President, vetoed this measure. Mr. Morrill was not satisfied with this set-back but started again, and finally, when in the higher house of Congress secured, in 1862, the passage of a new measure for the same great purpose. Abraham Lincoln signed the bill July 2, 1862, by which this great government gave away over eleven millions acres of land for founding what we now call our agricultural colleges. By this measure thirty thousand acres of land were granted for each representative that any state or territory had in Congress. The little state of Delaware, with its two senators and one representative, received ninety thousand acres of land. The great state of New York with its thirty-three senators and representatives, received nine hundred and ninety thousand acres. Up to this time there were no strong scientific institutions anywhere in America. Harvard College had no scientific department nor did Yale. In his great speech, which is a classic, Mr. Morrill said, among other things, that out of their wealth the rich had provided for the education of the professional



classes. There were schools, he said, for the education of persons of leisure, for those who wished to enter the professions of the ministry, law and medicine, but nowhere were there schools for the education of the children of the industrial classes, who must themselves work with their hands as well as their heads. He argued that the perpetuity of this government was not safe under such a one-sided system of education. He pleaded that since the rich had provided for the professions and left the industrial people without education, that the government fill the breach, and so the Morrill Act of 1862 was passed, and thereby came into existence the greatest industrial colleges and universities in the world. The Boston Institute of Technology, the great Cornell University, and all our state universities were mightily strengthened and advanced by this effort. The first departments to be developed in these industrial schools were those of the sciences, such as chemistry, physics, botany, etc. Close after came the various departments of engineering. The good accomplished in these lines is beyond measure. We hear much today of the rapid strides that agriculture is making in all of the lines of applied science; our great factories and machine shops are in evidence. This marvelous advance has been brought about through these industrial colleges founded on the Morrill Act. Thousands of young men are studying the sciences and the various branches of engineering in these great institutions, and these trained young men passing into all the fields of manufacturing enterprise, become the real power in these institutions. With trained heads and trained hands they are able to plan, to devise and invent as no other class of men could do. Our great manufacturing plants, our railroad corporations, our municipal advances, are largely brought about by this class of men. By the Morrill Act the educational trend of America was turned aside from the old days and pushed into new lines. Yale and Harvard were forced to put in scientific schools. Men came to realize that an education did not consist necessarily in studying Latin, Greek, mental and moral philosophy, with a smattering of mathematics and a tinge of popular science. The great good of the Morrill Act permeates every branch of our educational effort and is finally reaching into the public schools themselves, where the sciences are taught in an elementary way, and manual training is becoming a factor of prime importance.

But agricultural education dragged in these institutions. There were few students and less call for instruction. Nor was it to be wondered at in those days. Uncle Sam was giving away his land and begging the people to come and take it. Out here in Nebraska a man could have 160 acres of land for merely living upon it a short time; in fact he usually got the land that he set his heart on whether he lived on it or not. If he grew tired of his possession, if grasshoppers threatened his happiness, all he had to do was to pull up and move on. The white-topped wagon was much in evidence. Why should a man send his son to an agricultural college to learn about farming when he could gain possession of a quarter section of God's richest earth for the asking? The early efforts to secure teachers of agriculture were amusing if it were not so serious. College presidents and professors of languages thought they knew how to teach the young farmer. Cornell

University imported a highly educated gentleman from Ireland. This man walked about the farm with kid gloves on, carrying an umbrella over his head to save his complexion. Farmers learning of these impractical men with their impracticable ways, came into a frame of mind whereby they despised the colleges and said all sorts of hard things about them. Poor indeed for the most part were the teachers of agriculture in those early days. Worse even than the lack of teachers perhaps was the fact that there was no substantial body of agricultural information placed in teaching form. A poor teacher can do pretty well at instruction if he has good text books to use, or if he has a laboratory well equipped with apparatus, but our so-called agricultural teachers in the early days did not, for the most part, know how to teach and had no real body of information to impart that was in teaching form, and some of them had no real sympathy with the profession that they claimed to represent. The whole system was faulty in conception, in execution and in the men who were carrying on the work. No wonder that with cheap lands all about him for the asking the busy farmer despised the agricultural college, and no wonder that his sons went to the institutions to study anything and everything but agriculture. To illustrate how small was the conception of agriculture in a state institution I can illustrate by my own experience. Twenty-three years ago I was called to the University of Wisconsin to carry on the agricultural work in that institution. But the authorities did not consider that my time would all be needed in agricultural instruction or investigation, and so I was placed in charge of all the botanical instruction in the institution, then numbering about four hundred students, not one of whom was pursuing an agricultural course. Botany was a favorite study, and there I used your Dr. Bessey's splendid book in my class work. The President said to me that if the University grew, that some day they would divide the department, and I could take the agricultural side or the botanical work just as I chose, if I proved satisfactory. Think of a University with one lone man teaching all the botany and all the agriculture.

Now Dr. Bessey has no greater admirer than myself, and he has done a grand work for agriculture. God bless him in his splendid efforts. But there were needed agricultural teachers, and so I gave up the work in botany much as I loved it, and entered the unknown difficult field of agricultural instruction. Had I staid in botany my position perhaps would have been secure, but my lines of effort would have been comparatively narrow, and I am glad that since there were such good workers already in that field, that I chose agriculture. Many were surprised at my choice, for to them to follow one of the well marked sciences was pleasure itself, while to embark in agriculture left all in doubt and uncertainty. But I chose wisely in my own case and am glad that I have helped in a small way to place agricultural education on a higher plane than it formerly occupied. Gradually there came into the field men whose hearts were in sympathy with agriculture and gradually the field opened up and opportunities improved. Lands are now no longer to be had for the asking, and with the disappearance of free lands men have suddenly come to take an intense interest in farm realty and to feel that the possession of land is one of the highest of man's opportunities.

I would say to young men that they can gain reputation, friends and a vast acquaintance by pursuing agricultural lines. One does not have to be a teacher of Greek and Latin to have friends in these days. Any line of agriculture is interesting to a vast number of people, and wherever you meet men—in the banks, in the cars, on the streets—you will find them talking agriculture and interested in agriculture. The banker, the railroad president the merchant, either owns a farm or longs to possess one. The agricultural teacher is eagerly sought out by these men for conference and the advice he may give.

Another point I wish to make is that the classics and even the mathematics and many of the other studies, offer little opportunity for young men of from fair to excellent ability. These subjects have been worked over and over by highly trained men for centuries until it is almost impossible for one to make a discovery or to do anything which will improve or put them into a better or more useful form for mankind. Indeed, young men seem to realize this and teachers as well, if we may judge from the manner in which the classics are now taught. A short time since while riding on a train from the East to my home I fell in with a Princeton student who told me that he was in his senior year. He said that he was pursuing classical studies, as they all do at Princeton, but regretted the fact. I expressed surprise and inquired the reason. He stated that although he was perhaps the average of his class in ability, after all he did not really understand Latin and Greek, and believed they would be of no use to him after leaving college. He declared that over ninety per cent of the members of his class used "trots". I expressed surprise at this and asked him what a "trot" was. I think a good many students sitting before me this evening have perhaps ridden "trots" and need no introduction. To the farmers present I will say that a "trot" or "pony" is an English translation of a book printed in a foreign language. Some of these books have a line of Latin or Greek, for example, under which is a line of English, telling just what the words above mean. Such a book is an interlinear translation; such a book you see is easy. This young man told me that practically all the students in Princeton used literal translations in getting out their Latin and Greek lessons, that the students explained away the use of "trots" by saying that they could not afford to spend over an hour on a lesson, and that they could not work out a lesson in the old-fashioned way in any such time. Now think of this, farmers and students. Think of young men spending four years in college nominally studying Latin and Greek and using translations all the time, and going to the class-room, sitting in front of their professors, all pretending to be students of the classics. Think how these same teachers, if they were here to-night lecturing to you, would descant upon the beauties of the classics, how they would tell you that no man was really educated or cultured until he had been thoroughly drilled and could read in the original tongue the words of the immortals. What deception; what humbug. I have no objection to the classics, for they are as right and proper in their place as any other of the good things of this world, but in these days why should deception and fraud run rampant even in our

so-called higher institutions of learning. This young man told me that he could not read the New Testament in Greek with any satisfaction or comfort, and that while he could read the easier Latin with some freedom, he doubted if he could get much from the more difficult books. Those old writers of the classics have been a long time dead and a great deal has occurred on this great, big world and is occurring all the time, to take up our mind and thoughts. Why not sit down and read a first-class translation of Virgil or Homer and get all the inspiration and help from it we can rather than fraudulently spending our time with "trots" or "ponies?" Are there not a thousand things about us on every farm that are as grand and glorious, as interesting and helpful as these very classics? Why not study botany as your good Dr. Bessey teaches it, and learn about the tissues and the various parts of the growing plant? I would rather be a student with Dr. Bessey for an hour than spend a week in a college riding a "trot". Why not study an ear of corn in all its wonderful development? The corn plant is God's best single gift to America, and all these years we have neglected it as something beneath our notice. Over at the Iowa Agricultural College last week I saw nearly one thousand farmers in the laboratories bending over the tables studying ears of corn. Some were young men twenty years of age, others were gray haired and past the meridian of life, but all were earnest and full of zeal. Ambitious, highly trained teachers full of inspiring enthusiasm, were instructing these monster classes. I ask you if you think any of those pupils used "trots" to help them get their lessons? There is reason enough in the young men's minds studying the classics for the use of trots. Latin and Greek have been worked over and over until the whole field is stale and barren. Only the brightest and most thoroughly trained after years of patient effort can hope to find anything new in Latin or Greek. It is like working over an old gold mine that is practically exhausted of its precious metal. But how different the agriculture field. There is not a single direction in which an earnest, able young man, carefully trained, may not turn his energy and find rich rewards. The agricultural field today is a great gold mine, offering splendid rewards to the patient searchers for hidden treasures. Let me illustrate by taking horticulture and floriculture as an example of the great possibilities before us. Out in the beautiful Santa Rosa Valley in California there lives a man who is working wonders in plant life. I refer to Luther Burbank of Santa Rosa. A short time ago it was my pleasure to visit this man, who lives close to nature, and to nature's God. May I tell you something of his work and what he has accomplished? He was a poor boy working in a cotton factory, in Massachusetts, but even then he was a close student of plant life. Running across a field of potatoes one day he noticed a couple of potato balls, the fruits, which you know, resemble a small green tomato, they were a surprise to him, for this variety of potatoes, the Early Rose, is not a bearer of fruits as a rule. He stuck a stick down by the plant to mark it and watched when the fruits should ripen. One day when he went to inspect his treasure it was gone. Hunting about on his hands and knees he found the precious fruits or "potato balls," as we call them, saved the seed from them, planted them, tended the tiny

seedlings and finally developed a number of varieties of potatoes. One of these was the Burbank potato, so well known throughout the country. This he sold to Mr. J. H. Gregory for a considerable sum of money. He started in the nursery business and later moved to California, where he continued the work. Mr. Burbank could have made much money had he continued strictly on business lines, but he was too deep a student of nature and loved plants too well to think only of money making. I wish I could take you to his garden and show you some of his creations—perhaps you have seen some of them, for they are now being scattered all about the world. The ladies will recall that the calla lily, beautiful as it is, has no fragrance. Mr. Burbank has produced a calla lily the size of a silver dollar, rich in fragrance. Take the gladiolus, you know that the blossoms appear one or two at a time on the rhacis, beginning below and blossoming upward on the stem. Mr. Burbank has made the gladiolus blossom all at once. The ox-eye daisy as we know it, is a flower a little larger than a silver quarter dollar. Mr. Burbank has produced from this plant the Shasta daisy, a beautiful blossom three or four inches across. One of these have sulphur yellow petals. He has produced a white blackberry. He has crossed the strawberry and raspberry, producing a new plant. He has crossed the apricot and plum and produced the "plumcot." He has crossed the tobacco plant and the petunia, one of our garden flowers, and produced a new genus called "Nicotupia." He has produced a plum that contains no pit whatever. As I went about the grounds where Luther Burbank is carrying on his deep studies and reaching his marvelous results with plants, and when I witnessed his marvelous love for nature and his insight to her mysteries, it seemed to me that this seer had walked with God and learned his lesson from the Throne itself. Compare Luther Burbank's work with that of one grubbing away at Greek roots.

At one time the Greek language was a prolific source of results, but it holds out little hopes to students to-day. save here and there as specialists. I honor real Greek students as much as any other students, but the great field of opportunity to-day lies not in the classics, but along agricultural lines as well as many of the other industries. I urge upon the young men before me that they despise not the field of agriculture. Let the few who will, grub Greek roots, while you study nature all about you. Do not say there is nothing for you in agriculture. Go out into the corn field and study the wonderful processes of nature occurring there as the plants grow, fertilize and ripen the wonderful grains of corn. Is there not in the corn plant alone room for the ambitions of many of earth's greatest naturalists? Every part of the plant is capable of study and vast improvement. Only a short time ago I was down at Bloomington, Illinois, studying the work of the Funk family in the improvement of Indian corn. They brought to me record books filled with figures showing the results of analyses of samples of seed corn and the results from growing grains planted down long rows, each ear by itself. They showed me where two rows had been planted across the field, each row representing all of the grains from one ear of corn. Both ears seemed full of promise when planted, yet one of these ears had

given shelled corn at the rate of 132 bushels per acre and the seed from the other ear, apparently as promising, had produced 43 bushels of shelled corn to the acre. Why one ear had done so well and the other so poorly they could not tell, but there were the results. They will go on planting ears from the best producers and planting again from these in the effort to intensify and make pedigree corn. I ask you, young men, is there no chance for all your energies in studying Indian corn? Are you satisfied to simply plow the ground and plant it and cultivate the crop as your father did? Is there not in this one plant something to keep you interested all your life and bring you a competence along with happiness? You who have seen the splendid exhibit of corn now on the tables out at the Agricultural College cannot go home without a deeper interest than you ever before felt in the marvel of the maize plant. As you are preparing the land next spring I am sure it will be done in a better way and with more care than ever before as you start planting; the grains that go into the planter will be placed there only after thought and careful consideration. The planting will be done more methodically. The young corn plants will be far more attractive to you than ever before, and there will be happiness and joy in their cultivation. At harvest time there will be a larger crop and ten times more interest in it than ever before, and all because you have begun to see and appreciate the wonders of this plant, which you heretofore have grown year after year with scarcely a thought as to its wonders and beauties. Latin and Greek sink into insignificance in the minds of many a young man when compared with the possibilities that lie all about him along agricultural lines. Strange, is it not, that in this country we never begun to think much about Indian corn until we were producing over two billion bushels of that wonderful grain annually. Then they began to study it systematically at the University of Illinois, and the study has spread to the other institutions. A new line of pedagogical effort comes to us and our colleges are more and more prepared to teach practical things that at the same time possess the highest scientific interest.

Before I close I wish to tell you something of Denmark and its wonderful agriculture. Think of Denmark as covering one-fifth the area of Nebraska. Denmark has much poor soil along its western side—a lot of sand hills, no better than some you have in Nebraska. On an area of one-fifth the size of your state she supports 2,200,000 people. Now do not forget that, in considering what I have to say hereafter. Then she has to support royalty, keeping an army of some 50,000 soldiers in order to do as her neighbors and “keep in the swim.” Denmark has no iron mines, no coal mines, and her forests are not worth mentioning. The land has been cultivated from time immemorial. In Denmark you can walk over fields that were being farmed when Christ was on earth. In spite of the seeming great difficulties Denmark is prospering agriculturally. Forty years ago Danish butter was of a poor, miserable grade. Then the government took up the matter and agricultural colleges were established, one of which is the fine institution at Copenhagen. Experts were sent to England to study the wants of the English market, and the government gathering this information dis-

seminated it among the people. The farmers entered into co-operation and the milk of many farms was made into butter at one central point. For the benefit of your Legislature I wish to describe at some length one effort which the Danish government fosters in aid of improved butter. At the agricultural college near Copenhagen is a refrigerator room especially designed for the purpose. The professor in charge telegraphs or writes on a certain day to some forty odd creameries for each to send in a tub of butter by first express. The buttermaker has no chance to put up an extra fine article but must take from his cooler that which he has on hand. The package goes by first express to Copenhagen, where the forty odd packages are put in the cooling room. Three experts enter the room, run their triers into the butter, examine it and score it. This is repeated by two more sets of experts until nine have examined the butter. By this time the packages are bored pretty full of holes. A dealer takes away the butter under contract, disposes of it, paying a certain price therefor. A few days later another lot of tubs is received and examined in the same way. To pay the expenses of the expert, the shipping charges on the butter and the losses sustained on the operation the Danish government pays out about \$10,000 a year. Denmark covers one-fifth of the area of Nebraska. I would like to ask your most worthy Professor Haecker, who is here this evening, if the great state of Nebraska is allowing him \$10,000 a year for the study of butter. Now this is only one of the ways in which Denmark has fostered her dairy interests, and she has kept it up for many years past. What is the result of her efforts? Denmark exports each year over \$25,000,000 worth of butter—and her area is one-fifth that of Nebraska.

But Denmark was not satisfied in becoming the greatest butter producing region of the world. She has other strings to her bow. Having much skim-milk and whey from the factories, the Danish people undertook to produce a high quality of bacon. The government found out by study that it was useless to try to compete with Nebraska, Iowa and Illinois in producing lard hogs, for here corn is cheap. In her efforts to produce high quality bacon experts were sent to Ireland to see how bacon hogs were fed and how bacon products were prepared and put on the markets. Feeding experiments were conducted by the agricultural college. In these feeding experiments over \$50,000 were spent—and Denmark has one-fifth the area of Nebraska. I would like to ask Professor Burnett how many thousand dollars Nebraska has given him for pig-feeding experiments? What are the results of all this energy and outlay of money? Little Denmark—one-fifth as big as Nebraska, with a population of 2,200,000 people—exports about \$15,000,000 worth of pork products, mostly bacon, each year. But I have not told you of all Denmark's efforts in advancing agriculture. The hen has proved her great worth here in Nebraska, but she has shown even more wonderful things over in Denmark. In the United States we produce lots of eggs in April, May and June, but even then we do not ship many. I am eating eggs at my home this winter that cost three cents each, and they are not very "fresh" although often fully "ripe". What is the value, do you suppose, of our egg exports from this great and glorious

country about which we boast so much? Forty-five states in the Union, recollect, and some of them great agricultural states. Our egg exports from the whole United States amount to about \$500,000 annually. What do you estimate the egg exports in Denmark? Remember now, she covers only one-fifth the area of Nebraska and has a population of 2,200,000 people. Little Denmark exports about \$5,000,000 worth of eggs annually, or ten times as many dollars' worth as the whole United States.

But you will feel that after all we are as great a people agriculturally as Denmark. I cannot argue with you, but let me say in closing this part of my talk, that the United States ships vast quantities of cotton, wheat, corn, fat cattle, beef, pork, etc., to other countries. The total of our agricultural exports equals eleven dollars each year for every man, woman and child in America. *Little Denmark, with its dense population, exports thirty-three dollars' worth of agricultural products for every man, woman and child in the country, or three dollars to our one.* But further, do the farmers of Nebraska realize that Denmark has to buy corn from the United States in order to make this excellent showing? Corn produced in Nebraska, Iowa and Illinois is shipped clear to the seaboard, loaded on ships, taken to Copenhagen, unloaded on cars which are drawn out into the country and left at the little railroad stations. Then the farmers haul the corn home to their Danish farms, feed it to their live stock, and ship the butter, pork, and eggs back to England. Yet young men in Nebraska are wondering whether after all agriculture is a large enough vocation for their brains and ability.

I wonder if there are any members of the legislature here this evening. I hope there are, for I wish to talk with them a few minutes. The Nebraska State University is one of the great institutions of the great Mississippi Valley. Marvelous as has been your growth, you are yet in your infancy, and few of you dream of what this institution is to become. Fortunately you are in having a President who is broad-minded enough and wise enough to build up the institution symmetrically and to let agriculture have its full share. I do not mean building it up symmetrically according to the old ideas but according to the new ones. Your Agricultural College, which was so long of no particular credit to your state, is now growing as rapidly as your Nebraska sunflowers grow in late summer along the roadsides. You can fairly see it grow! I have made a study of agricultural colleges and their work. I have visited twenty-five such institutions on the other side of the water and have visited nearly all in America. Your Agricultural College is doing a work creditable in every particular, considering the short period that it has been moving in the right direction, and doubly creditable when you measure its product by the money you have so far invested in it. I have been delighted to witness the marvelous progress you are making in the way of new and better buildings, splendid equipment, etc. You have worthy men as professors, and I urge you to stand by them.

Last week, as I have told you, I was at the Iowa Agricultural College. That institution is forging ahead at a marvelous rate. Go over and visit it and observe the splendid results they are achieving through the large investments made at Ames. Stand by President Andrews in his work of



building up the University, and by Professor Burnett in his development of the Agricultural College. You will never regret it. Members of the legislature, I urge you to appropriate money freely to your Agricultural College. Regard the dollars you put into it as money invested that will bring one hundred per cent a year returns. That may be usury but it is a kind of usury your people can stand. I have been delighted in observing the character and bearing of the hundreds of men, young and old, I have seen here attending the meetings out at the Agricultural College. I observe how straight they stand and how they walk, as if they owned the earth. Not long since I heard a man say he was "only a farmer". Out here you are proud to be called a "farmer." In some places in this country a man will talk about "going into business." Perhaps you even have a few who will go into Lincoln or some other town in Nebraska and start a peanut-stand or a grocery with a stock of goods representing about \$700 investment, and then strut about talking to people about "going into business." If that is "going into business" what in the name of common sense is about owning and operating one hundred and sixty acres or a larger territory of Nebraska's splendid soil? Who, after all, is the business man, the peanut seller, the dealer in plug tobacco and canned goods, or the man who raises a fine crop of corn, breeds pure-bred animals and lives like a prince on his own domain?

Some of the young men in this school hold their heads high because they are in the law college. Perhaps you have two or three hundred of them. What would happen to Nebraska if you should ship every one of these out of the state when they were graduated from your University? Would Nebraska be much poorer and would the people hold a day of fasting and prayer when they left you? Supposing some one were to telegraph Chancellor Andrews that he wanted a carload of lawyers. How long would it take him to fill the order? If you cannot fill it in Nebraska, I can easily do so from Wisconsin, for we have in every town young men well trained in the law, well meaning fellows, too, who have made the mistake of going into an overcrowded profession. When word comes to Professor Burnett that a well-trained young man is wanted for some line of agriculture, how many has he on hand to fill the order with? At the Wisconsin Agricultural College we have many calls for such men that we cannot supply. Every community in this broad agricultural land needs well trained young men to help on its agriculture in the breeding of pure-bred live stock, in the improvement of corn, in making country life desirable and lifting it to a higher standard—in a thousand ways these young men are needed. Your Agriculture College is the leading source of supply. It is adding dignity to agriculture as a profession, and the legislature, thoughtful citizens and friends of advancement generally cannot do too much to help it on in its splendid work.

My friends, what I have said tonight was in the endeavor to show you that agriculture is really a great vocation worthy of the ambition of the most talented men. That all about us on the farm nature spreads her choicest treasures for our benefit. We must train our minds and open our eyes

to the beauties of nature as found on the farm. We have in the past too often looked in the wrong direction and too far away for the best that can come to us. Let us see it as did the poet when he wrote "sermons in stones, books in running brooks, and good in everything".

## THE RELATION OF THE FARMERS' INSTITUTE TO OUR NATIONAL SYSTEM OF AGRICULTURAL EDUCATION.

ADDRESS BY PROF. JOHN HAMILTON.

Mr. President, Ladies and Gentlemen: Before announcing the topic upon which I am to speak, I desire to express the surprise and gratification that I feel in seeing the large attendance of your representative farmers at this convention. I have had some opportunities for becoming acquainted with what is going on throughout the country in the matter of the advancement of the interests of agriculture, and I think it can be truthfully said that there has been no time in the history of our country when there has been as great interest manifested among intelligent men of all classes in the development of this industry as there is today. As I go from state to state I find that their best men, the best citizenship of these states are awake to the importance of agriculture as a part of the industrial system of the country, and are earnestly striving to advance its interests by attending such meetings as this and participating in the discussions that arise.

Some weeks ago I received an invitation to address an association of agricultural students of your University, and supposed that it consisted of a club of a dozen or perhaps twenty agricultural students in attendance at the college. You can imagine my astonishment to find a hall filled with 400 of your young men, 200 of them members of the agricultural classes in your University and the others visiting students who had completed their course in agriculture in past years and who are now out upon your farms putting into practice the teachings which they here received. This is the finest sight that I have seen in all my travels.

Through the courtesy of the officers who have charge of the program under which these meetings are being held, I have been permitted to choose my own topic for discussion to-night. After thinking over several subjects that might be of interest to you, I have selected as my topic the Relation of the Farmers' Institutes to our National System of Education.

As you know, my duties are in connection with the Farmers' Institute work of the United States. At its last session, Congress created in the office of Experiment Stations of the Department of Agriculture at Washington, the position of Farmers' Institute Specialist. The purpose in creating the office was to equip the Department for rendering assistance to those who are engaged in the farmers' institute work throughout the United States. The Department of Agriculture for some years has realized that the farmers' institutes would unquestionably become an important branch of the National system of agricultural education, and that it was important that this department which has been taking the lead in so many other directions in agricultural improvement, especially in agricultural education,

should likewise take part in aiding the states in developing this new field of "farmers' institute work."

The rapid deterioration of the farm lands of the eastern and southern states that has been occurring ever since the settlement of the country, became at length so apparent that our legislature became alarmed lest the impoverishment of the soil should reach such a stage as would compel farming people to abandon their living and move to the towns and cities in order to subsist. That this fear was not altogether ill-founded is evident from conditions that exist throughout many of the New England States, and in the tobacco, cotton and corn districts of the South. Thousands upon thousands of acres in these sections have become almost sterile, and great areas once in full cultivation and producing abundant harvests are now left to grow up in brush and briars, or to be washed away by floods that become more and more destructive as the vegetable matter that once held them in place is lost.

We are all familiar with the history of the nations that abandoned agriculture for city life, and left the farms to slaves to occupy and till. One fate befell them all—the destruction of their agriculture, and the consequent overthrow of the State. Our statesmen as well as our most thoughtful and patriotic citizens have always realized that the first duty of those who desire to perpetuate the Republic is to see that the agricultural interests are protected and that the conditions of life out on the lands are made such as will be in all respects desirable, and farming be sufficiently remunerative to make it possible for the owner to earn a livelihood for himself and family, secure a competence within the usual period of active life, and do so without impoverishing the soil. Previous to our occupying this continent the Almighty had been storing fertility in these lands for thousands of years. Our ancestors and ourselves have been engaged in skimming the cream from American soil, in endeavoring to abstract fertility from our farms as rapidly as possible, selling it off year after year until, as I have stated, in many districts the lands are now scarcely worth the value of the annual tax.

It was not until 1862 that anything definite or general was done to arrest this deterioration. When at length Congress undertook to legislate in the interests of the agriculture of the country, it acted upon the broad principle that the only permanent way to improve an industry is by improving the men who control its operations. The way, therefore, to improve agriculture they agreed, was to apply this principle to that industry, and first improve the men in charge of each individual farm. Anything short of this would prove ineffectual, and be but a temporary nostrum whose benefits would be evanescent and of little permanent worth.

Education unquestionably must be the means by which agriculture must be improved and be secured against the destructive practices that have hitherto prevailed. Congress, accordingly, by act of July 2, 1862, donated public lands for each Senator and Representative in Congress from the several states, 30,000 acres to each, to be sold and the interest of the proceeds to be applied to the support of at least one college in each state

whose chief object shall be to teach such branches of learning as are related to agriculture and the mechanic arts. About sixty colleges of the character of yours in whose halls we are met to-night, are under the provisions of this law.

It was expected that young men from the country would flock to these institutions by the thousands for the information and training which the land grant colleges would furnish, and that immediately there would be a great revival in agriculture throughout the United States, that the country districts would speedily be filled with educated young men who would follow agriculture as a profession and who would at once arrest the deterioration that had been going on during the century that preceded the enactment of that law. To the astonishment and great chagrin of the friends of these new institutions, it was found that comparatively few of the young men of the country were taking advantage of the opportunity which the land grant act provided. There seemed to be but little demand for agricultural education on the part of those who entered these institutions and very few were found taking the agricultural course. The instructors in these colleges also discovered that there was very little reliable agricultural information to be had that would be of value to the classes that they were expected to teach. For twenty-five years these colleges were compelled to grope their way, vainly searching for some form of curriculum that would be satisfactory and for some method of instruction that would prove effective in class-room work.

The friends of these institutions at length concluded that before the colleges could possibly do the work for which they had been founded, it would be necessary to provide means for the securing of information that would be reliable and at the same time be of direct value to agriculture.

Congress was again called upon to solve a second great problem in agricultural education. Accordingly after carefully considering the entire question, Congress passed in 1887 an act providing for the establishing of agricultural experiment stations in the several states, whose duty it should be to investigate, test, and experiment in order to discover the truths of science as they relate to agriculture. These stations were required to collate their results from time to time, to publish them in bulletin form, and distribute them for the use of farmers. It is from the time of the establishment of these stations that the improvement of our agriculture dates. It is these institutions that have given the impetus to agriculture that we see exhibited everywhere, and that is responsible for the great assembly met in this hall, and the active interest that is manifested here to-night. Sixty of these stations are now at work, officered by a force of over 700 men and women engaged in the discovery of truth for the benefit of agriculture. The oldest of these institutions has had but sixteen years of life, and in that brief period agriculture has been revolutionized, has become a science, and is now ranked with the learned professions. In this period a large amount of literature, valuable for farmers, has been secured by these station men. The mailing list of their publications now numbers about 500,000 names. Publications containing most valuable information secured at great cost of

money, and time, and labor are now being distributed throughout the land without expense to those to whom they are addressed.

In the same year in which the land grant colleges were established, indeed in the same month of that year and on succeeding days, Congress took a small and inconspicuous company of nine persons out of the Department of the Interior and formed them into what was thereafter to be known as the Department of Agriculture of the United States. The appropriation for the entire work of this new department was \$60,000 for that year. This band of men has grown until last year there were connected with the department 4,200 men and women, over 1,900 of whom are scientists or scientific assistants, all giving their entire attention to the discovery of scientific truth relating to agriculture, and publishing the results of their investigations in bulletins for the use of farmers. This department now has its men in every country, north, south, east and west, and in the islands of the sea, searching for information or discovering plants and animals that will be of use to the people of the United States. So that through the instrumentality of this department there is being brought into this country from all over the world, the south of Africa, the plains of Russia, the interior of Asia, the plateaus of South America, from all lands, valuable plants, animals, and products in the hope that somewhere in our domain there will be found a suitable spot upon which one or more of these foreign products can be profitably grown, that will add to the wealth and prosperity of the agricultural people of our land. No similar institution in the world surpasses the National Department of Agriculture in its personnel, in the ability, the capacity, and scientific attainments of the men who have been gathered in this great department and are devoting themselves to the development of the agriculture of the United States.

Perhaps the most convincing demonstration of what is being accomplished is seen in the work of the Division of Publications of the department into which, as into a great mill, are brought the results of the work that is being done by the department force in all of the bureaus, divisions, and offices from all their various fields of research, to be put in printed form for distribution to the people of the country. Last year the publications of that division were over 900 in number. These 900 publications were composed of 45,000 separate pages. That is, a set of volumes beginning with page one would run up to 45,000 pages without a single duplication. All of this vast amount of valuable material issued by this department in a single year. In addition to furnishing this amount of scientific literature, a library in itself, there were printed and distributed during the year 11,600,000 copies of these publications, and 6,600,000 of them were bulletins specially prepared for the use of farmers. No such publication house of agricultural literature exists elsewhere, and the scientific material that it uses in the composition of its bulletins and books is up to date and of the highest grade.

Here then we have the agricultural colleges preparing young men for the scientific pursuits of agriculture, the experiment stations securing information, valuable for these colleges to teach and for farming people to under-

stand, and there is also the National Department of Agriculture searching the world for the information that exists in other lands and bringing valuable material to be distributed on our own soils and in our own climate for use by the farmers of the United States.

The stations and the colleges, as has been shown, have been doing most valuable work, have been securing a vast amount of excellent literature along the lines of agricultural science adapted to the practice of every day life.

But as we came to the realization, years ago, in regard to the land grant colleges that had been established with almost nothing in the way of information to impart to the young men who came up for instruction, we now have come to another realization, to the discovery that although we have at hand an abundance of information in printed form of inestimable value to the agricultural people of the United States the average farmer does not read.

Bulletins sent out by the experiment stations and the National Department of Agriculture, containing information that would be the salvation of multitudes if disseminated and thoroughly understood, are not generally read, but too often go into the waste basket, or furnish kindling for kitchen fires, or are deposited upon the dusty shelves of closets and are never read. A mailing list of 500,000 by the experiment stations, and 11,600,000 by the National Department of Agriculture, and yet thousands upon thousands of our farming people do not so much as know of the existence of this literature, much less of the information that these publications contain. The bulletins are offered without money and without price, and yet I am afraid to ask for a showing of hands, even in this assembly, to see how many of you are familiar with their contents, or avail yourselves of the information which they bring.

The average farmer does not read, and there is perhaps a reason why this is true. He may even have been a student in his youth, but the physical exercise required to conduct a farm obliges him to be out early in the morning and continue work until late at night, so that after the exertion of such a day the tired farmer taking up a bulletin or agricultural report finds himself unable to give it his attention and naturally and almost inevitably falls asleep. During the season of active farm work from early spring until late in the autumn there is but little time to read, and then as winter comes and the long evenings, when time might be had, the man has lost the reading habit until as year after year of this routine continues we find the average farmer contenting himself with the country paper and the morning and evening chapters read at family prayer.

The reading habit, like the church-going habit, is easily and rapidly lost. Omit going to church for six months, and the inclination to go, in a great degree, disappears. Omit reading for a year, or two, or three, and this habit will likewise lose its hold and the effect to master the contents of a single book becomes a burden which few will voluntarily undertake.

The Farmers' Institute has come to supply this most important need in our system of agricultural education as it has been developed during the

past fifty years. It has come to take the information of which I have spoken that is now lying dormant, and for the distribution of which no adequate means has yet been found, has come to carry it out to the farming people at their homes. The institute employs men for this service who have informed themselves with regard to some one or more of the difficult problems with which agriculture has to deal, men who read, and sends them out to those who either have lost the reading habit, or never acquired it, and stands them up before such farmers in institute assemblies, and has them tell what science has done to help agriculture and agricultural people in the prosecution of this art, and then these lecturers are required to submit to a cross-examination by those who have questions to propose or desire additional information, in order to make clear that which they have tried to present.

The institute aims to send these teachers into every hamlet, and requires them to carry to the most remote sections the information which the farmers need. Last year institutes were held in every state in the Union excepting three, and in every territory except Alaska, Porto Rico and Indian Territory, and over 900,000 farming people attended these institute meetings. The teaching force engaged by the state directors, outside of such persons as were assisting the local or county managers, numbered 924.

And now, Mr. President, I wish to speak for a little upon the relation which the land grant colleges organized by the National Government in 1862, and the experiment stations, and the National Department of Agriculture, bear to the Farmers' Institute of the United States. What is the relation of these three great institutions to this our most modern agricultural school? It seems to me that these institutions in their relation to the farmers' institutes can be separated into two distinct classes. In the first is the agricultural or land grant college, established under the act of 1862. In the second are the experiment stations and the National Department of Agriculture at Washington.

The first class of institutions were organized to teach agriculture and the mechanic arts. For this they were endowed, and for the accomplishment of these ends the funds received should be applied. It was a low position which these institutions occupied forty years ago. I know something of their history, having been associated with one in another state since 1865, and well remember when these colleges were sneered at as being the conception of men of low ideals in education, and their students were regarded as inferior in educational accomplishments to the graduates of the classical institutions of that time.

I am thankful that we have lived to see the day when all of these old classical colleges have had not only to accord a place to industrial education, but have also been compelled to readjust their courses of study to correspond with those which the land grant colleges were first to formulate and introduce. The land grant colleges have risen from their humble beginning in 1862 to a first place in the education of to-day, and are rightly now regarded as the leaders in scientific thought and progress everywhere throughout the United States. They have in their faculties something over 3,000 teachers, and in their class rooms about 50,000 students, and yet more than one-half of

these teachers and students are engaged along lines other than those of agriculture. How long will it be before these institutions will reach the great mass of agricultural people of the United States if they continue to restrict their work to the comparative few who come up to their halls for the training that they need? Has the time not come when we ought to review the traditional methods so long pursued by the colleges and universities of the world? Is there anything in the land act of 1862 that limits the instruction of your University or of any other of the colleges founded by that act to the walls of the class rooms of these institutions? Has not the time come when these colleges should broaden their work, reaching out to the thousands that are in need outside their halls?

The colleges have been waiting, waiting, waiting for people to come to them, when it is manifest to all that the great mass of men will never come; that the great mass of men are held, by bonds that they cannot break, from leaving home for any period sufficient to complete a college course, and yet these men are in need of the very information and training which these colleges have to give. It is gratifying to see some of these institutions becoming alive to their responsibility, and are sending out missionaries through the country to discover boys and girls who would like to have a college education and are urging them to come up to these institutions and get the training that they need.

Whilst the giving of instruction in college is a part, and a very necessary and important part, it is only a fraction of the work which the land grant colleges can, and as I sincerely believe, are under obligation to undertake. Their mission, like that of the Gospel, is to all men, particularly to those who are their neighbors, who are residents of their state, and teaching by their faculties is not necessarily to be limited to the students who matriculate at the several colleges in which these teachers happen to be employed.

Does not the Farmers' Institute suggest a direction in which these colleges broaden their work, and increase their usefulness, and carry out in a large way the spirit of the act to which they owe their existence and from which they derive their principal support?

I hold that the men who are now out under the charge of the state directors giving institute instruction are, educationally speaking, the representatives of these colleges, are in truth performing service much of which it is the duty of these institutions to render. Whilst not formally connected with the faculties of these institutions, they nevertheless are the peers of their members and educationally are fully qualified for the duties which these faculties have assumed. Should the colleges be ashamed of association with these teachers in this new school of learning? Should they regard them as they themselves were esteemed by the classical institutions of a century ago? Are they below the grade of the men that make up the faculties of your industrial colleges? In short, is the Farmers' Institute force of lecturers worthy of your respect? I have said that over 900 lecturers were on the institute force of the United States under the direction of the state directors.

As soon as possible after my appointment last April I made an effort to discover the character and qualification of the men who were on the lecture



force. From a somewhat extensive acquaintance among these lecturers I was convinced that they for the most part were men and women of superior capabilities, but did not have the exact information that would enable me to show conclusively to others precisely what their attainments are, and of course I was unable to give an expression of opinion without first being in possession of the facts.

Accordingly a personal letter was prepared and sent to each of the 924 lecturers on the force as reported to me by the directors of institutes of the several states. The circular asked for replies as to age, school training, academic degrees, past occupation, the specialty that the individual professed to teach, and other like information that would be of use in estimating the character and qualifications of these instructors. There were received 623 replies. Of those giving information, 287 bore college degrees from A. B., to Phd., and L. L. D.; 138 had taken partial college courses of not less than two years; 108 had normal or high school training, and although 90 had only ordinary education in the public schools, they had had special opportunities for understanding the particular topics which they were scheduled to teach.

Here is a force of institute instructors that may be put against those composing any college faculty in the land for training, ability, and efficiency in the work. No faculty need be ashamed of the men who are out in the field teaching agriculture in the Farmers' Institutes. No blush will be brought to your cheek because of the infelicity in expression, or by reason of any error in an assertion of fact, or misstatement of scientific truth on the part of these men who are engaged in this grand work of educating the agricultural people of the United States.

The institute directors are conducting a university upon a most stupendous scale. Almost 1,000,000 farming people were reached last year. 10,000,000 of active workers still need instruction, and the time is surely coming when the entire 27,000,000 of agricultural people of the United States will have the opportunity of hearing the gospel of agriculture proclaimed by one or more missionaries such as these who now compose the institute lecture force.

Last year 3,179 institutes were held in the United States. The number of sessions, which show more clearly than any other data the extent of the work, was 9,570, each of which lasted for half a day, and during which the farmers of the country were receiving instruction from the best scientific teachers that the nation has produced.

And now what ought to be the relation of these land grant colleges, this institute teaching force? Manifestly that of the brethren or members of one great faculty whose work lies along lines that lead to practically a single end, namely, the elevation of farming people by means of special education in the several arts and sciences embraced by their profession. Instead of expanding these institutions in directions away from agriculture, here is work for all time to come in strict accord with the spirit of the endowment which these colleges received, and in a direction in which scarcely anything has been attempted on any high grade plane by educational institutions in the past.

But there is still the other set of institutions to which allusion has been made which have an important relation to the institute work. I refer to the agricultural experiment stations and to the National Department of Agriculture. These two educational organizations, as has been shown, have been engaged in securing information for the use of agricultural people, and a great amount of valuable literature has now been prepared. The method of distributing this information by means of the printed page has been found to be at best exceedingly slow, and in other respects has failed in adaptability to the conditions which exist among farming people. Few read the bulletins and consequently the information which they contain is not generally disseminated and most of the beneficial results hoped to have been accomplished by this means have not been realized.

To these institutions the Farmers' Institutes have come as valuable allies in their work. They come as distributing agents to take this information and carry it out to the practical farmer and explain to him the methods by which the principles that have been discovered can be applied in the prosecution of his art.

In order that the lecturers themselves might be thoroughly informed as to what the experiment stations and the National Department of Agriculture have in their possession that is likely to be of use to the farming people, each experiment station director in the United States was requested to send lists of his publications to the 924 lecturers of the country, and to supply each with such bulletins of information as they may issue from time to time in the interest of agriculture. The National Department at Washington has also sent lists of its publications to these institute teachers, and now all are regularly receiving these documents from both of these sources of agricultural knowledge. It will, therefore, soon be inexcusable for any institute lecturer not to be thoroughly posted upon his specialty, or to fail to be an authority upon at least one subject in agricultural science.

Lest, however, the impression should be left that the colleges and stations have been indifferent to the institute movement, I wish to state that last year 196 agricultural college and experiment station men suspended their teaching work in these institutions, and gave 1,666 days of their time to giving instruction in Farmers' Institutes. In twenty-one states of the Union the entire control of the institute work is in the hands of the officers of these institutions.

Is it any wonder that with such a force of capable teachers a great movement in behalf of agriculture has set in, and is now in full tide, advancing the interests of this industry everywhere throughout the land? Can you wonder that thousands upon thousands are attending these institutes that they may get the information that these teachers have to impart? Is it surprising that men are coming up to the meetings such as this at which you are gathered, paying railroad fare, living at hotels for days, losing time that is much needed by their business at home, counting that the outlay is fully justified because of the valuable information which such meetings always supply?

The possibilities that lie before the agricultural people of the United States

are very great. A slight increase in production of the land now under tillage would add enormously to our wealth. We exported during the year ended June 30, 1902, \$1,350,000,000 worth of products to other lands. Of this \$851,000,000 were agricultural products. After feeding 80,000,000 of people here at home as no other nation has been fed, and after furnishing forage and grain for the millions of cattle scattered over the hills and valleys of the United States, we were able to spare \$851,000,000 worth of surplus to go to feed the hungry in other lands. I estimate that if only a slight advance were made to the low average which we now produce, as \$5.00 to the value of each cow, \$10.00 to each horse, 50 cents to every sheep, 30 eggs to every chicken, 4 bushels per acre to our present crop of wheat, 9 bushels per acre to our crop of grain, and to other animals and crops in like moderate proportion, there would be for export of agricultural products of the \$851,000,000 of a year ago over \$1,400,000,000 more, all going to add to the profits that the American farmer would receive in a single year.

That such an increase in production is not beyond the range of possibility is strikingly shown by an experiment conducted in my native state by ex-Governor Hoard of Wisconsin. A creamery having fifty patrons was taken near Montrose. Twenty-five of those who patronized the creamery took a dairy paper, and twenty-five did not. An accurate record was kept for a year of the products of each dairy with the following results: The readers of a dairy paper averaged for the year per cow \$53.23; the non-readers averaged \$32.95 per cow, a difference of \$17.28. The readers fed per cow during the year \$35.15 worth of feed. The non-readers fed per cow during the year \$32.29. The readers received as profit for each cow \$15.08 per year, the non-readers a profit of 66 cents per cow per year.

If a little information will effect such a great improvement in a community in a single year, what might we not expect if the great mass of information that now exists were placed in the hands of the 30,000,000 farming people of the United States, not simply for a single year, but year after year as the new discoveries of science become known. The Farmers' Institute can, in the hands of the colleges, and the stations, and the Department of Agriculture at Washington, become their most valuable instrument for the spread of the information which they are annually securing, and its force of teachers should be numbered by the thousands, instead of by the hundreds as at present, and their efficiency be continually increased, until the entire agricultural population become thoroughly aroused to an appreciation of the great opportunities that education, agricultural education, brings to the tillers of the soil.

Next paragraph was adopted. The next several paragraphs were adopted.

Mr. ———: I move you that the further details of this matter be referred to the Board of Managers with power to act. Adopted.

Mr. Harvey: (Reads in part as follows:)

*Resolved*, That inasmuch as an invitation from Mr. Frank Iams, of St. Paul has been received by the Revision Committee on the rules, Adopted.

PUBLIC COMFORT BUILDING.

The last Legislature appropriated the sum of three thousand dollars for

the erection of a public comfort building on Fair Grounds. There were expended for this purpose as follows, under contracts with the State Board of Agriculture:

Paid Express Publishing Company .....	\$11.00
Paid Campbell Brothers .....	900.00
Paid Campbell Brothers .....	900.00
Paid M. Leach .....	103.20
Paid C. D. Campbell Brothers .....	1,030.00

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\$2,944.20

Balance unexpended ..... 55.80

This matter is here presented simply to show an improvement on the Fair Grounds, and its cost.

## COUNTY COLLECTIVE EXHIBITS, 1903.

COUNTIES COMPETING AT THE 1903 NE- BRASKA STATE FAIR AT LINCOLN, NEB.— TOTAL NUMBER OF POINTS 1900.	Premium	An'l Subs Neb. Farmer	Corn	Wheat	Oats	Barley	Rye	Other Vars of Grain	Native Grasses, Etc.	Tame Grasses	Potatoes	Onions	Cabbage and Beets	Squashes and Melons	Sheaf Grain	Miscellaneous	Arrangement	No. of Varieties	Points Scored
Saline.....	1st	100	68	97	94	89	78	90	92	100	94	68	74	72	98	85	94	97	1401
Howard.....	2d	90	95	92	81	88	78	73	82	93	80	91	74	98	86	88	95	87	1377
Washington.....	3d	80	100	93	92	88	78	91	84	92	77	87	75	81	70	83	92	88	1360
Nebraska.....	4th	70	78	91	87	81	81	82	88	85	55	88	57	96	90	88	97	98	1343
Cuming.....	5th	60	73	82	87	85	81	83	86	84	58	87	79	90	88	85	91	87	1333
Hayes.....	6th	50	78	82	87	85	82	84	75	84	58	86	79	79	88	83	89	83	1299
Antelope.....	7th	40	73	85	78	82	77	67	56	82	52	83	65	92	91	77	84	88	1281
Gage.....	8th	30	65	80	77	78	69	65	86	84	72	83	64	87	88	77	84	68	1247
Scott's Bluff.....	9th	20	75	83	88	73	67	73	72	73	62	85	65	82	81	76	77	81	1280
York.....	10th	10	57	87	80	77	67	69	86	80	58	85	62	77	86	77	80	84	1183
Frontier.....			57	88	82	77	82	59	82	82	59	87	72	65	87	82	78	86	1181
Brown.....			56	83	79	70	77	58	82	80	58	77	72	67	87	85	76	80	1086
Burns.....			56	83	79	70	77	58	82	80	58	77	72	67	87	85	76	80	1086
Rock.....			53	80	80	70	76	43	77	71	80	83	60	50	87	83	72	63	1083
Hitchcock.....			53	84	70	77	76	43	43	58	80	75	72	80	72	85	67	78	1075
Kearney.....			68	86	47	0	85	58	28	58	88	83	73	88	55	67	83	88	1040
Thomas.....			63	48	47	0	58	38	120	92	80	83	73	88	57	67	83	88	1019
Franklin.....			62	79	82	0	65	38	133	45	89	74	69	62	57	57	42	62	886

Mr. McIntyre: I move that the new president have until 3 o'clock to name his new board of managers, and that we now take a recess and adjourn to meet at the Lindell Hotel at 3 o'clock. Carried. Adjourned until 3 p. m., to meet at Lindell Hotel.

Room 350, Lindell Hotel, 3 o'clock, p. m.

President Dinsmore: The meeting will come to order. The matter as I understand, the recess was taken to this time and place for the purpose of receiving and acting upon the nominations for the new board of managers.

President-elect Mr. Mellor: Mr. Chairman, and members of the board, I desire to state that the members I have selected are as follows:

C. H. Rudge, Lancaster County, Chairman.

Peter Youngers, Jr., Fillmore County.

H. L. Cook, Howard County.

J. B. Dinsmore, Clay County.

G. W. Hervey, Douglas.

J. B. Hervey, Douglas County.

President: You have heard the names of the board of management as presented by the president-elect, what will you do with them?

Mr.——: I move that the nominations be confirmed, and that the names presented be elected as the board of managers for the ensuing year. Carried.

The appointment is approved.

What is your further pleasure.

President Mellor: Mr. Chairman and Gentlemen of the Board of Agriculture: There are times in men's lives when they don't feel much like talking, and this is one of the times with me.

I appreciate fully the responsibility that I am about to assume, at least I think I do, and I hope that you will assist and give me your very best assistance in this coming year. I think that we need all our united efforts on account of the St. Louis Fair. It will be a hard matter to run a fair in the state of Nebraska in 1904 in order to make it pay. Again, I wish to thank you gentlemen. (Applause.)

Mr. Bassett: I move you that it is the sense of the Board of Agriculture, that their thanks be tendered to Mr. Dinsmore as President of the State Board of Agriculture. Seconded.

President Mellor: It has been moved and seconded that it be declared the sense of the Board of Agriculture, that their thanks be tendered to Mr. Dinsmore as the retiring President of the State Board of Agriculture. I would like to take a rising vote. All in favor of this please rise. As it is unanimous I will not count the noes.

Mr. Dinsmore: I thank you very much for this expression, perhaps more than I can say and say it as it should be said. I have at all times tried to do what was my duty as a member of the Board, and especially as President, and as it has met your approval it is all the record that I need.

President Mellor: Is there anything further to come before the meeting. If not a motion to adjourn is in order.

On motion the meeting adjourned.



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# APPENDIX

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## LANDS MOST SUITABLE TO PLANT, AND CARE OF THE ORCHARD IN CENTRAL NEBRASKA.

This is a subject of great importance to know where to plant an orchard. Our soils and localities are not all adapted to the successful growing of fruit. We should study the nature of our soils and trees that we are going to plant. The apple tree is best adapted to the clay soil that we find in the canyons or draws. My observation has been wherever I find an apple tree growing on clay soil, I find a tree that is sound and healthy. The apple hangs on and matures and grows larger then on other soil. The clay soil holds the moisture better than the black loam on our prairies.

When we have dry hot weather in July and August the apples drop before they are ripe, unless the trees are on low ground and the roots get water. A great many of the orchards on the prairies are dying for want of water. that is the case with trees on top of the hills on the rolling lands.

I have in my orchard one block of 1,200 apple trees. It is on the rolling prairie. There is a canyon or draw running through it in such a way that part of it is protected from and part exposed to the winds and storms, that may come from any direction. When I planted the trees I told the boys that were helping me, that we would see which kind of soil and slope was the best to plant an orchard. The hills sloped in all directions. We had trees down in the canyons and we had trees on side hills and on top. The results are that the trees in the bottom of the canyon winter killed, those on the top have made a slower growth. Those on the edges of the canyon and side hills on the clay soil made a good healthy growth and are loaded with apples every year. The apples hang on until matured, while those on top of the hills, the apples begin to drop with the blossom and keep dropping all summer. By the time they are ripe there are not many left and what are, are small and poor quality, that is the winter varieties.

The summer apples that ripen in July and August hang on and ripen fairly well. In planting an orchard care should be taken to plant all the winter varieties on the lowest ground. The low ground holds the moisture longer. The late apples have a better chance to mature. The apricot does the best on the clay soil. I know of two orchards that are planted on clay soil. The apricot trees are full every year with fine fruit while those that are planted on that black loam scarcely ever bear any fruit. The peach does the best on top and side hills. The cherry will grow on any soil. It yields its fruit before we get the hot winds and sun. The best fruit land we have are on our rolling or bluff lands, the more broken the better. Plant

the plum in the bottom of the canyon, the apple on the foot and side hills, the peach on top.

If there is a rough or broken piece of ground on the farm that is the place for the orchard. I was talking with a man the other day. I wanted to know why he had no orchard. He said that he had planted trees several times and they did no good for him. He thought there was no use to plant any more. I asked him if he had no bottom land on his place. He said he had a canyon of about six acres. I asked him if he had ever been over to Mr. Ottos to see his orchard in the canyon. "Why yes! He has lots of apples, cherries and apricots every year. I never thought why it was he always had fruit. I will break my canyon and plant an orchard in it. It is of no use to me for anything else," he replied. So it is with many that have planted orchards and have had failures. They planted their orchards where they should have planted corn or alfalfa. When planting an orchard the wind break is one of the things that must not be forgotten. The trees should be protected from winds, especially when in bloom. If the tree is exposed to the wind the pollen will be blown off before it is ripe and ready to fall on the flowers to fertilize them. A tree that stands out by itself, exposed to the wind, may bloom every year and scarcely ever have any fruit on it. The pollen is blown off before it is matured. Some years you will find the fruit all on one side of the trees in the orchard where they are exposed to the wind. The fruit will be evenly distributed all over the trees when protected from the winds on all sides.

In planting care should be taken to select varieties that are adapted to your locality. Some varieties will do well in one locality and be a failure in others. It is too expensive to plant and cultivate a tree for eight or ten years and find it a failure. Let the other fellow do the experimenting. Select none but young trees one and two years old with heads low. When planting dig holes at least one and one-half feet deep by two and one-half feet wide. Fill them up with surface soil in the bottom. Set the trees two or three inches deeper than they were in the nursery. Spread the roots and cover them with fine soil two or three inches deep. Tramp this dirt down on the roots then pour in a pail of water and fill the hole with loose earth and leave it. Never tramp on it after the hole is filled up. The loose earth acts as a mulch and lets the heat of the sun down to the roots. This starts it to growing. Cultivate the same as you would corn. Keep all weeds away from the trees. Corn or vines can be grown between the tree rows for four or five years successfully, after that use the disc harrow to keep the weeds down between the trees. I have found the hogs a great help in keeping the weeds down and the ground loose under the trees. They dig out the grubs and June bugs that burrow under the trees.

In pruning you should be careful not to expose the body of the tree or the large limbs to the sun. Nature has provided the branches and the leaves to protect the body of the trees from the scorching sun. We should assist nature by removing all decaying limbs and branches and thin out where they grow too thick.

When the trees are young you must keep watch for bunny. He has an

idea that young apple trees are planted for his special benefit. When he begins to try his teeth on the bark of the young tree, take a slice of an apple, put a little strychnine on it and tack to the side of the tree with a lath nail, and you will have no more trouble with him. I have tried several remedies. This is the most successful. Keep the worms and codling moth off by spraying three or four times during the summer. In planting do not forget the Wright seedling peach. This tree has proved to be as hardy as the wild plum here in Buffalo county. In the winter of '98 and '99, when all the other varieties were killed or damaged more or less, the Wright went through without a twig being hurt and bloomed and bore peaches those years. Last April 29 or 30, when we had the big ice storm, our peaches were in full bloom. All were killed but the Wright. We got a fine lot of peaches off them. Had it not been for a hail storm we got in May, we would have had a full crop of peaches on them.

J. A. HOGG,  
Shelton, Nebr.

### SHEEP FEEDING

BY PETER JANSEN, OF JANSEN, NEBRASKA.

Mr. Chairman and Fellow-Stockmen: Having handled sheep in Nebraska for thirty years it seems natural that I should be called upon to relate my experiences. However, sometimes I feel that I am "talked out" on the subject; that I have nothing new to offer that might be of benefit or interest to my patient listeners.

Before telling you what little I know about sheep feeding permit me to congratulate you upon these instructive and profitable meetings of stockmen and farmers which have been so successfully inaugurated by the Agricultural Experiment Stations of our University. Nebraska I believe is the only state in the Union whose wealth rests entirely upon the products of the farm and range. We have no mines or oil wells (some of us may have stock in them to our sorrow) no resources but those of agriculture and live stock.

It is therefore no more than proper and right that we should offer our boys the best of opportunities to get a thorough knowledge of these industries, and our Experimental Station is certainly doing a grand work in teaching our young men the science of agriculture.

We have shown the world some of the results of our work by taking the championship prize with our steer "Challenger" who was graduated, so to speak, at our Experimental Station, and whose mounted hide will be looked upon with pardonable pride by every Nebraskan visiting the St. Louis Exposition, where I expect him to be the centerpiece of our exhibit.

How fortunate the boys of this advanced age are! When I was a boy back in Russia we had no Experimental Stations where we could be taught the lessons of soil study, of balanced rations, of rotation of crops and a hundred other things which the up-to-date farmer of this century has to know. Neither had we the little book on "Elementary Agriculture" which your teachers, Professors Bessey, Bruner and Swezey have so ably compiled,

and which should have a place among the text books of every school. We had to experiment for ourselves and profit by our mistakes, and sometimes we had to pay high for our tuition.

But we must return to our muttons, as the French say.

In the early seventies, when I came to Nebraska, even the eastern portion of the state was but sparsely settled, and large flocks of sheep were kept for their wool mainly. The range was still free, and we felt as if we owned the land, and did not even have to pay taxes. These conditions soon changed. The range was cut up into farms, the virgin soil was broken up and planted to corn, and the keeping of large bands of sheep became impracticable. We then commenced to fatten our surplus sheep for the market and soon found it to be a fairly remunerative business, if carried on properly and conservatively.

Soon bands of feeders were trailed from the ranges of the far western states and territories to Nebraska, and fattened upon our cheap corn and hay.

During the eighties the business developed very rapidly, but remained in the hands of comparatively few large feeders, who annually had from ten to thirty thousand head of sheep in their feed lots, and who bought their corn and hay, until some seasons there were over one million head fattened for market in our state.

Since then the business has undergone another evolution and to-day we find more men engaged in it with smaller flocks, farmers, who raise their own corn and hay and who use the sheep as a medium to market their grain and to enrich their land by the means of the "golden hoof."

It seems entirely right and proper that this should be the case. In this branch, as well as all others pertaining to farming, stock raising and feeding, the spirit of the times points to more intensive, more scientific pursuits, on a smaller scale.

The farmer who wants to buy one or two, or even half a dozen carloads of sheep for the above purpose had best get them at our local market, the South Omaha Stock Yards where, during the fall the receipts of feeder sheep from the West are quite heavy. If he is a judge of sheep it will pay him to spend a few days there, and select his purchases himself. He should then see that the sheep are thoroughly dipped before taking them out. If he has no experience he had better employ the services of a reliable commission house, one, which makes the handling of sheep a specialty.

Those of us who still follow the business on a larger scale sometimes find it profitable to buy our feeders on the range and to ship them direct to our feed lots. Thanks to the efforts of the efficient head of our Bureau of Animal Industry at Washington, Dr. Solomon, and his able assistants, "scabbies" or "scab" as we commonly call it, the bane of the sheep feeder, is very nearly under control in the west, and I believe a few more years of strict enforcement of the present rigid sanitary rules will entirely eradicate it.

Whether shipped in from the range or the stock yards your sheep will be very gaunt, hungry and tired when they arrive at their destination. We always try first to fill them up on stubble fields or prairie grass, before giving them any grain. If you put them into the yards at once, give them all the

hay or other roughage they will eat for a day or so, until they get rested up and accustomed to their new surroundings.

For years each fall we have had several bands help us do the corn husking, with very good success. I like them better than the usual two-legged corn huskers for the reason that they do not strike, and besides they board themselves.

The past fall was especially fine for herding in the cornfields. We had one band of over 4,000 head, which one man on his pony, with his well-trained dog handled successfully from the 17th day of October until just before Christmas; they are fat now.

The main point in feeding corn that way, is to never let your sheep get hungry; keep them in the corn all the time, and you will have but few pelts to hang on your fence. We always sow rape in our cornfields, and find it a very desirable adjunct to the dry corn and stalks. Of course these sheep were given a full ration of grain at once when finally put into the feed lots. Where it is not found desirable to herd them and the sheep are put direct into the yards you have to get them into their grain gradually. I like to start them on oats, if possible, or oats and corn mixed half and half. As we all know, oats are an almost naturally balanced ration but they are also the highest priced grain, pound for pound.

Bran is a very good substitute for oats, and at the present price, \$11 per ton, as cheap as corn.

In about thirty days you should have your sheep, if they are strong wethers, eat about a pound and a half of grain per day, and that is about all they will stand for any length of time.

If ground oil cake is not too high, say \$25 per ton, two or three ounces of it per sheep per day will be a paying investment. My favorite ration would be two thirds shelled corn, one third oats with an addition of either the oil cake or bran, or, if possible, both. I suppose your learned professors would call that a fairly well balanced ration.

For roughage, alfalfa is, of course, decidedly the best, but I doubt whether climatic conditions will ever allow us to raise it on a large scale in Eastern Nebraska. We use sorghum and Kaffir corn with equal good results, and I have made some very fat sheep on nothing but good straw for roughage. I believe in feeding plenty of hay or its substitutes.

Of course, it goes without saying, that sheep should always have access to pure water and salt, whether in the feed lots or the corn fields.

When in the feed lots I believe not more than 500 head should be kept together, and 300 is even better.

I am aware that probably half the sheep in Nebraska are being fed in open yards without sheds. For my part, I prefer a good shed, open to the south. I think the sheep are more comfortable, and I myself can sleep better in the event of a blizzard.

To keep yards and sheds dry and well bedded is very essential.

I have mentioned scab before, and will only say here that every feeder who intends to stay in the business should have a dipping plant, to be used in case of emergency.

The Government formula, if strictly carried out according to directions, is a sure cure for scab.

Now as to the profit in the business, my friends, that is very problematical, and depends entirely upon the supply and demand, as well as the skill with which you handle your sheep. The American people are somewhat erratic; if, for instance, we have had good prices for fat sheep one year, and have made a little money, a lot of new feeders are apt to jump in next season and overdo the business, and the result is disastrous. The packers are sure to take advantage of a glut, and hammer prices below the cost of production.

You cannot jump in and out and hit the high places; you are more liable to strike the low ones. If you are fixed to feed sheep and if you have a liking for the business the only rational way is to stick to it and take the average.

To the beginner I would say: Start in slowly and get your experience. Buy a carload or two and see how you like it. Then, if successful, try some more next season, but don't think that because you have handled a thousand head profitably, you can do the same with 10,000 and multiply your profits by ten; you can't do it.

In marketing, again much depends upon your commission house. Employ one with a regular sheep salesman of good standing, and even then don't cuss if he cannot get you the top-notch every time, or fails to bring you in on all the high days.

Except in the case of heavy export sheep, I have found it more satisfactory to sell my sheep at the South Omaha yards than to ship to more distant markets. South Omaha today is the second largest sheep market in the country and I have predicted that it will stand first before many years roll by.

Should my remarks give any one here a pointer which may prove beneficial, I shall feel amply rewarded. I thank you for your kind attention.

### CARNATIONS.

Probably no flower has advanced as much in the past ten years as the carnation, caused principally by the great improvement of new varieties in size and keeping qualities.

A new carnation to be a success today must have several qualities stronger than its predecessors in its color, a strong, vigorous grower giving a long, stiff stem, a large flower with a calyx that don't split, a prolific bloomer and good keeper; the color, whatever it may be, must be distinct.

To be sure a limited number of fancy colored flowers may be grown with profit for retail trade, but rarely does a customer ask for a dozen variegated carnations; the same may also be said of the crimson and yellow varieties.

But on a commercial place the number of varieties may be more limited. Out of the hundred or more varieties now in commerce I think we could get along nicely with twelve or fifteen, possibly with less, selecting those best adapted to our soil.

To the careful growers the health of the next year's stock is always a

problem of greater importance than almost any other with which he is forced to deal in his yearly routine of work.

So much depends upon the careful selection and proper handling of the cuttings that are the foundation of future success that no one can afford to intrust this important work to the careless and inexperienced. The most practical eye and thorough knowledge of all the conditions that tend to bring out the best that is in this flower are none too good or expensive to be devoted to this branch of our work, for every unhealthy cutting that is taken will surely produce a diseased plant and is more than labor lost.

Even with the best of selection and cultivation, varieties are prone to lose vigor and "run out."

The carnation is not a plant that lends itself readily to perpetuation by cuttings, at least not under the present methods of culture, under which are grown every day in the year, and year after year, without a suspicion of rest.

Those who know the origin of our race of monthly carnations and are familiar with its habits will admit that type still holds many things in common with its ancestors. Perhaps after many years of cultivation under glass the race will become so accustomed to the conditions to which it is subjected that it will be as easy to perpetuate it by means of cuttings without injuring its vitality as it is easy to perpetuate a tea-rose.

We owe the vigor of the race solely to the fact that new varieties are grown from seed and introduced into commerce in such numbers that it takes but three or four years to supersede most varieties. We no more than think at last we have attained perfection in some color or type than there comes another variety just a little better and we are forced to discard our pet and plant a new one in its place. Who can tell how long a course of improvement will continue and what gems we may yet attain? When we have attained that type of perfection the race will probably be so thoroughly accustomed to its environments that few of the characteristics of its ancestors will be noticeable. Until that time comes, however, we must make the best of conditions as they are and spare no pains to keep up the vigor of our stock.

The very best time of the year to propagate is during the two darkest months of the year, January and February. In those months we not only have the elements surrounding the cuttings in the sand under perfect control, but the stock plants from which they are taken are in such a condition that we can readily detect any plant that does not possess the most perfect health and vigor. All such plants should be avoided when cuttings are selected.

Except in a very few cases we take all our cuttings from flowering stems. Not only do these cuttings make the best shaped and largest plants in the shortest time but this course, if long pursued, will give a stock that is more free-blooming than will result from the practice of taking cuttings from the base of the plants.

Especially have we become convinced that this is the only proper course since dry-rot has shown us what a dreadful pest it is when once it makes its appearance on a place. We have learned by repeated experiments that



once any part of a plant is attacked by this disease there is absolutely no hope of saving it by cutting away the aforesaid branch. Like leprosy in a human body, when once its presence is seen the whole plant is filled with germs of the disease. What, then, must become of the cuttings that are taken from plants so affected?

Last year our plants were planted in the field early in April, having had plenty of air day and night to harden them. After being out four or five days we had a cold snap with about two inches of snow and the mercury fell to 28 degrees, but the snow protected the plants and they started to grow at once, seemingly none the worse for their cool reception by mother earth.

Some of us if we do not succeed with a new variety the first year say it is no good, while if we would note its shortcomings perhaps we would find that we were at fault for at least part of them, and so we discard a variety that may have proved a valuable factor to our list. We have proof of this the present winter with the variety Jubilee which we have been growing with only moderate success for several years. This year we gave it a whole house by itself without bottom heat and have kept the temperature at 46 to 48 degrees at night, being 6 degrees colder than we grow most varieties. The treatment speaks for itself, as the house is the best one on the place, and has been since the first of December, not a plant missing or sign of disease in the house.

So we trudge along always looking for something better and seldom are we disappointed.

IRWIN F. FREY,  
Lincoln, Nebr.

### SOME THINGS I HAVE LEARNED.

1st. That the dairy business can not be learned in one day, one month or one year, even if one does read all he can about the business. Reading about the dairy and running the dairy are two different things. There are things we must practice before we can learn them. Milking is one of these things. We become experts only by actual practice. One that can start and milk a steady gait will have better results than the one that milks fast, then slow, then fast again. We must learn to milk a steady gait and as fast as it is possible for us to keep it up until the cow is milked dry.

Feeding is another thing we must experience before we can feed successfully. The amount each cow wants and the quantity she wants, we must learn by actual practice.

2nd. It is impossible, or almost so, to buy a No. 1 dairy cow. She is seldom if ever for sale, and if she is for sale a friend or neighbor will buy her. We cannot tell the value of a dairy cow until we have milked her through one period of lactation, and used the scales and tester in determining the quantity and quality of her milk. She may have a perfect shaped body and udder, and yet be defective in some way. She may have the self-milking habit, be a kicker, be breachy or hold her milk and not let it down as she should, or have some other habit that would make her an unprofitable cow.

The safest way is to raise the dairy herd by careful selection of dam and sire, and by using only the very best milk strain to be had.

3rd. A cow will fail to yield to her owner a profit on an empty stomach, or when she has the shady side of a barb wire fence for shelter. She must be satisfied with both feed and shelter for twenty-four hours a day, seven days in a week and fifty-two weeks in a year in order to be profitable. Comfort means profit with a cow. If she is satisfied, she will not need an iron yoke or a crotch of a cotton-wood limb to keep her from going through the fence.

4th. By keeping a record of both quantity and quality of each cow's milk, I have learned that better care and feeding will produce better cows. The time it takes to do this amounts to but very little and will detect the robbers in the herd.

5th. I have learned in the past season that my cows running in the pasture would fall off gradually for four or five weeks. Then, after a good shower they would go back to their former yield per day. If I had supplied them with feed during that time my profit would have been greater.

6th. It pays to get a good dairy breed. They are generally of a kind disposition and when you feed a dairy cow she will show it in the milk part and not in the laying on of flesh. With the beef breed it is just the reverse.

7th. It pays better to run a dairy without a dog; the cows are quieter; the dog that nips their heels will cause kicky cows. The moment one touches the cow's leg, while milking, will kick, thinking the dog is after her. I used to think it was impossible to get along without a dog to drive the cows, but since we have been without one, the cows are much more quieter and do not offer to kick. I have no fault to find with a dog for stock cattle.

8th. It pays to keep the cows and also the stable clean by having a floor of some kind and a gutter six or eight inches deep, and sixteen or eighteen inches wide behind the cows. It is then an easy matter to keep the cows and stable clean. The barn should be cleaned both morning and night. The heifer calf that is kept in a clean and dry place till she becomes a cow will not lay in filth if she can help it. Also if a heifer calf is provided with clean water and not allowed to drink out of a mud puddle it will be hard to get her to drink filthy water. I have five Jersey cows and one heifer that were kept and raised in a pasture that had only a mud puddle for them to drink out of and after I got them, they would drink out of a mud puddle before they would drink out of a tank. None of the other cows would do this.

9th. By feeding the cows after milking, the milk will not have any disagreeable odor from the feed we may feed them. In my part of the country we are bothered very much with wild onions or garlic in the pastures, and for a few weeks in the spring we can hardly use either milk or butter. But when we take the cows off the pasture three to four hours before milking the smell of the onions cannot be detected in the milk or butter.

10th. Sugar beets and sugar beet leaves or tops may be very good feed but must be fed carefully, or they will cause the milk to have a peculiar smell. They should not be fed heavily if cows are kept in the barn all the time on account of the strange odor they cause. Tops make much better feed if cured, but if fed very heavy it will take a long time to churn the cream.

12th. I have learned that a calf given alfalfa hay as soon as it will eat it will make a better calf than if fed any other roughness I have ever fed. I have raised as good calves on separator milk, oil cake and alfalfa hay as can be raised running with the cow. Oil cake and alfalfa hay are cheaper than butter fat.

13th. I have learned that it will take years to build up a very good dairy herd and that we must be very careful in breeding or purchasing our herd. My plan in starting out would be to purchase good heifers, just a little before they become fresh. By careful selection and care, one can build up a good herd in a few years.

14th. I have learned a great deal in the past years, no doubt, only what others in the dairy business have learned years ago. I expect to learn a great deal more if I stay in the business. I intend to stay at it too. I find that it requires our attention every day. We have no days off. We do not have to wait till the end of the year for a harvest. It comes every day. It is a very good teacher to teach one to attend strictly to business. When we are working by the month or day and stop, our pay stops too. We would lay off a great many days if we could make the dairy pay and lay off too.

In the dairy business, if we neglect our work for one day we do not only suffer loss that day but for days to come. I find it is a very good business for one that has a family growing up. One can teach the children to be industrious and helpful. I have learned that I cannot tell the boys to go and do this, but when I am with the boys and say come let's do this or that thing we can accomplish something. My wife and I expect to have a day off once in a while by and by, and know that the work will not be neglected. It is an occupation that is healthful because you have the pure articles for food, pure milk, pure butter and good veal and plenty of exercise. These will make the doctors wish they had a few cows to milk. It beats all the drug establishments in the world for health. Neither do we need the drugs to keep the pure articles sweet. We draw it fresh every twelve hours. What better do you wish for you and your family?

J. A. HARRIS,  
Shickley, Nebr.

### EXPERIMENTS IN CORN BREEDING.

BY CYRIL G. HOPKINS, UNIVERSITY OF ILLINOIS.

As a fundamental principal, corn breeders recognize that every corn plant has an individuality which corresponds to the individuality of animals.

Probably few agricultural plants offer such advantages for improvement by breeding as the corn plant. The individual plant is of sufficient size to be easily distinguished and the general characteristics of the plant are readily observed; as for example, the height and diameter of the stalk, the number and size and position of the ear of the stalk, the length and strength of the ear shank, the size and shape of the ear, and the amount and quality of the grain.

The fact that the different grains of corn on a given ear are markedly uniform in composition and in their ability to produce plants similar to

their progenitors is another advantage; but perhaps of equal or greater importance is the tremendous reproductive power of corn; that is, the multiplying power or the ability to increase in numbers, or quantity. A simple computation will illustrate this remarkable advantage in breeding corn.

An ear of good corn commonly has 16 to 20 rows of kernels, with 50 to 60 kernels in the row. Thus, a single kernel of corn in a single season under favorable conditions will very commonly produce an ear bearing a thousand kernels usually amounting to at least three-fourths of a pound of corn in weight. No one will doubt or question this and yet if three thousand kernels are all planted and are equally prolific, we have a million kernels or at least 10 bushels of corn, at the end of the second year.

At this rate in three years' time from a single seed we have ten thousand bushels of corn.

And at this same rate in four years' time we have ten million bushels from a single seed.

Again, at this same rate, and in only five years' time, from a single seed we have ten billion bushels of corn, which is four times the annual corn crop of the United States and four times as much corn as would be required to plant the entire area of the globe. But, you will say that this is impossible. Of course, it is impossible on poor soil, with poor care, with poor seed, or during poor season; but is it impossible to grow a thousand kernels of corn from a single grain, and is it impossible that under favorable conditions each one of those thousand kernels might produce an equally large increase? If not, then this computation may serve to illustrate the possibilities of reproduction in corn under ideal condition. Columbus reported that the Indians grew corn with 700 kernels on the ear, four hundred years ago. But we may reduce the size of the ear to 500 kernels and still we find the reproduction power of the corn almost incredible.

One of the possible disadvantages in corn for breeding purposes, as compared with some other plants and with animals, lies the open fertilization of the corn plant and the consequent inability of the breeder to control absolutely the male parent, but this disadvantage is very largely overcome by placing the breeding plot in an isolated spot far removed from other corn; or, what is nearly as satisfactory and usually more practicable, by surrounding the breeding plot with corn of practically the same breeding, and then destroying or detasseling all apparently imperfect plants.

One other possible disadvantage is the danger of too close in-breeding but it now seems certain that, if this possible danger should prove to be real, it can be entirely overcome by detasseling the plants in the field rows from which seed ears are to be chosen.

In corn breeding there are required:

- First, the breeding plot;
- Second, the multiplying plot;
- Third, the commercial field.

Beginning with about fifty of the best obtainable seed ears, selected with

special reference to the qualities or characteristics desired, we plant the breeding plot, which should consist of as many field rows as we have seed ears, one ear being planted in each row. A record is made of the characteristics of each seed ear and the seed ears and field rows are so numbered that the performance record of each seed ear can be determined by the yield and other characteristics of the field row produced.

As the tassels begin to appear all apparently imperfect plants and all plants in unsatisfactory rows are detasseled.

Each of the field rows is harvested separately, the exact yield being registered. The most desirable ears borne on good stalks are kept separate from the imperfect ears. All corn is rejected for seed purposes except the most desirable ears from the best yielding rows. For a breeding plot of fifty rows we would select about five ears from each of the ten best yielding rows, making fifty seed ears for the next years breeding plot.

The remaining good seed ears from the ten best yielding rows constitute the seed for the next year's multiplying plot, which will usually consist of ten to twenty acres. All apparently imperfect plants in the multiplying plot are detasseled and the yield of corn produced is registered.

All of the most desirable seed ears produced in the multiplying plot serve as seed corn for the next year's commercial field, which may consist of several hundred acres. When the commercial field is harvested the yield is registered and the finest seed ears are selected and carefully dried (with artificial heat if necessary) and they constitute the first stock of pedigree seed corn for the market.

It will thus be seen that three years' time is required before the seed corn breeder is able to furnish to the market pedigreed seed corn from his commercial field.

The first year he has a breeding plot planted with carefully selected, but not pedigreed seed (unless he has obtained registered seed from some other breeder.)

The second year he has a breeding plot and a multiplying plot, both of which are planted with registered pedigreed seed obtained from the best yielding rows of his first year's breeding plot.

The third year he has a breeding plot, a multiplying plot and a commercial field, all planted with pedigreed seed, the seed for the breeding plot and for the multiplying plot being from the second year's breeding plot, and the seed for the commercial field being from the previous year's multiplying plot.

Of course the breeder may sell a few pedigreed ears from his breeding plot if he has more choice ears from the best yielding rows than he needs for both breeding plot and multiplying plot the next year. He may also sell a few bushels of pedigreed corn from his multiplying plot in case it furnishes more choice seed than is needed for his own commercial field; but his main stock of pedigreed seed corn must always come from his commercial field.

The breeder himself does not plant seed corn taken from his own commercial field. Each year his own stock seed comes from his multiplying plot,

and the seed for the multiplying plot must come from the best yielding rows of the breeding plot, this seed being second only to the fifty most perfect ears which are each year selected for the next year's breeding plot.

In general this is the method of corn breeding which is followed.

We may breed corn only to increase the yield of grain, or we may also breed for many other purposes; to improve the physical characteristics of the ear, so far as we know what are desirable physical characteristics; to increase or decrease the height or size of the stalk; to raise or lower the ear in the stalk; to improve the composition of the grain by increasing or decreasing the protein, oil or carbohydrates, as may be desired.

No sooner had the Illinois Experiment Station worked out the method and demonstrated absolutely (although on a small scale) that the marked improvement of corn by breeding is possible, than the Illinois Seed Corn Breeders' Association (and more recently several other similar associations) took up the work, and they are rapidly demonstrating that the breeding of corn is practicable and profitable on a very large scale.

The individuality of the seed ear becomes apparent when one field row yields 50 bushels per acre and another adjoining row planted from a different seed ear but on the same kind of soil, produces 120 bushels per acre. Such differences are not unusual in breeding plots. Similar differences are often seen in different animals, sometimes even among the different pigs from the same litter. Experiments have shown that one cow may produce 250 pounds of butter fat in a year, while another cow even when consuming the same quantities of digestible nutrients, produces only 180 pounds of butter fat.

In changing the height of the ear on the stalk we have selected one lot of ears born seven to eight feet from the ground and another lot born three to four feet from the ground and, when these two lots of corn, both of the same variety and taken from the same fields, were planted on the same kind of soil side by side, the one lot produced ears which averaged about eighteen inches higher from the ground than those produced from the other lot.

In changing the protein content of corn we began breeding the same kind of corn in two different ways, one lot to increase the protein, the other lot to decrease the protein. The first year the percentage of protein was the same in each lot.

The second year it differed by 65 per cent.

The third year by 60 per cent,

The fourth year by 1.60 per cent,

The fifth year by 2.98 per cent,

The sixth year by 4.07 per cent, and

The seventh year by 4.00 per cent.

Similarly we have tried to change the oil content in two lots of what was originally the same kind of corn, increasing the oil in the one and decreasing it in the other. The first year the one lot contained 4.70 per cent of oil and of course the other lot contained the same per cent.

The second year the one contained 4.73 and the other 4.06 per cent, the

third year the one contained 5.15 and the other 3.99 per cent, the fourth year the one contained 5.64 and the other 3.82 per cent, the fifth year the one contained 6.10 and the other 3.54 per cent, the sixth year the one contained 6.09 and the other 3.43 per cent, and the seventh year the one contained 6.23 and the other 2.95 per cent.

Several corn growers have suggested, and more recently two or three scientists have assumed (in theory), that it is a waste of time to breed high protein corn because we can get plenty of protein in clover hay and other legumes. Perhaps this is true, but it would seem that an extension of the same theory would do without corn entirely in the balanced ration, because we can get plenty of carbohydrates in straw or corn stalks.

So long as the live stock feeders continue to buy oil meal, gluten meal, and other concentrated food stuffs valued chiefly for their protein content, so long the corn breeders will continue to breed high protein corn for feeding purposes.

They will also breed high-protein, low-oil corn to meet the demands of the hominy mills. On the other hand, they will breed low-protein, high-starch corn for the factory use where the starch is purified or manufactured into glucose or alcohol, while the protein is considered an unprofitable by-product; and, for those manufacturers who desire it and are prepared to separate and refine it, the oil of corn will be increased by the corn breeders to meet that demand. But the first object of the corn breeders should be, and probably always will be, to develop corn for the highest possible yield of grain per acre.

### BREEDING, CARE, AND FEEDING OF HOGS.

PROF. J. H. SKINNER, INDIANA EXPERIMENT STATION, BEFORE NEBRASKA STATE SWINE BREEDERS' ASSOCIATION.

In discussing so broad a topic as the one assigned to me, limited time makes it necessary to only hint at many of the important features of this profitable industry.

To begin with, success with hogs will be just in proportion to a man's attention to little details and his business ability. Breeding and raising hogs is just as much a business as banking or any other commercial enterprise.

The successful hog men of the country are big broad-minded men full of push and enterprise, moreover they are enthusiastic students of their business. There is no place for a man in this work unless he is willing to give it his time and put much hard work into it. It is not the most pleasant task to sit up all night with a sow, but it is frequently necessary. For the man who likes the business and is willing to put time and energy into it there is no other live stock business any more profitable and pleasant. The profit is good with quick returns.

The producer of pure-bred hogs is interested in three important things, the breed, the individual and the pedigree. At the outset I may say that all modern breeds are good, all have a place, no one has a monopoly of all the good points and the man who goes into the breeding business should be governed in his choice of breed by his surroundings, the trade or market

demands and opportunities for sales along with his personal likes or dislikes. It may be that the location in regard to others will determine or help determine the choice. Frequently a community of breeders will be an advantage in selling. In some instances it may be better for the beginner to take up a different breed from that found on neighboring farms and thus take advantage of the opportunity.

One need only look over the hogs that appear in any of our large markets in order to be convinced that there is great need for more careful selection of parent stock in case of market hogs. Other evidences of the neglect of this most important matter are to be found in the small litters, lack of size, bone, etc. Pure bred hog men give much more attention to the work of selection than men who are producing for the market, but too little attention is given the matter by both classes of breeders. They have ignored essential points to the detriment of the breeds.

In selecting breeding stock, one of the first and essential considerations is the breeding. It is important alike to all classes of breeders. The knowledge of the breeding and ancestry of the breeding herd enables one to tell to a reasonable degree of certainty what the offspring will be. Furthermore, the prolificacy of the herd may be influenced by selecting breeding stock from such strains as have proved to be of value in this respect. It is well to select animals whose ancestors have good breeding and feeding qualities, and in the case of the pure-bred herd, they should come from noted families and strains that have achieved success in both show and sale rings. These have intrinsic merit and sell more readily to breeders.

While pedigree and breeding are important features in the selection of breeding stock, individual merit should be kept in mind. Too many are inclined to buy pedigrees without anything back of them. Having considered breed and breeding, one should decide on the type of hog he desires to breed and then pay particular attention to the form and quality of his animals. The most profitable type will be one which has, along with good breeding quality, plenty of bone, good size, and at the same time, quality and early maturity. The females should be of good size, have good lines, have a straight and slightly arched back, short, broad head, large deep heart girt well sprung rib, strong back and loin, with large deep hams and standing on good feet, and strong legs of medium length. Some will prefer young sows and others old. On this point successful men differ. Much depends on conditions. Where one is producing pork for the market young sows may be most profitable if properly mated with a mature male. On the other hand, a tried sow is usually to be depended on, and the breeder of pure breeds will not give her up until she has begun to go backward. The breeding of young and immature animals is likely to lead to undesirable results, such as lack of size, lessened vigor, impaired breeding and feeding quality.

Having selected the foundation, it is important to breed so the pigs will come as near the same time as possible, as uniformity means much, both in feeding and on the market. Here again the time of breeding will depend on conditions and surroundings. If a breeder or showman, very early spring pigs are worth two or three times as much as late ones. Such men can well



afford to provide suitable shelter and sufficient protection to save the youngsters in severe weather. The pork producer, on the other hand, will doubtless find more profit in pigs which are farrowed after the severe weather is over, as they require less care and attention. This brings us to the matter of conveniences in breeding, shelter, etc.

We use a breeding box of our own construction with very satisfactory results. On the matter of shelter I may say that there are several principals involved, such as temperature, moisture, sunlight, ventilation and exercise. These features are most easily and economically obtained in portable, individual sleeping houses with a central feeding floor or shed. The pure bred men will find a farrowing house desirable and profitable. In my opinion, much of the disease among hogs is due to dust, dampness, too much corn, a lack of exercise, and parasites. Better sanitary conditions will mean the saving of thousands of dollars or hogs—fresh bedding, clean floors, sweet troughs and pure water will work wonders.

It is desirable to have both male and female in a thrifty, vigorous condition at the time of mating. Over fat or very thin animals will not be productive of the best results. Our practice is to have the females in fair flesh and gaining at breeding. Our males run in lots forty by sixty feet long ordinarily, but where they are inclined to become fat and lazy we place them in large lots with young, restless pigs and thus induce them to take more exercise. The feed of the male consists of shorts, oats, clover hay and milk,—if we have it,—with roots and green feed in summer and winter. The sows receive a small amount of corn in connection with the above mentioned feeds in winter. The sows may run together for a time after breeding, if given proper shelter. It is necessary, however, to see that they do not over-crowd or cuff about certain timid, or less rugged ones; after a time it is desirable to separate them, putting two together until near farrowing time when each should have a separate bed. We feed liberally up to within a few days of farrowing time, then cut the feed down, bringing them back to feed gradually so that by the time the pigs are ten days or two weeks old, the sow is giving a full flow of milk. While the pigs are on milk is a very important period in their lives and much may be gained by giving careful attention to the feeding of the dam. Young pigs are tender, helpless things, consequently need warm, dry quarters and a comfortable bed which is not exposed to wind. The more sunlight they get the better. One of the greatest leaks we have in the hog business in Indiana, and I presume the same is true here, is in the loss of pigs at farrowing time. Much can be done to stop this loss or leak by giving attention to feed, shelter and bedding. As stated before, it is absolutely necessary that the young pigs' bed be dry if the best results are to be obtained. In cases where the sow is a heavy milker and the pigs scour, we feed the dam blood meal. This has been very efficient in checking the trouble. After the pigs are old enough we scatter cracked grain over the floor and thus encourage them to eat as early as possible. Green feeds, such as clover, alfalfa, oats and peas and rye make the dam and litter thrifty and supplement the grain ration. The aim should be to keep the sows in good flesh while suckling, as it is profitable both from the standpoint of the litter

and the effect on the mother. After ten to twelve weeks the pigs should be weaned and at this time milk, if available, will be valuable along with the grain and grain feed, and while it may not be possible with some to do it, grading or sorting will be profitable where one is handling a considerable number. We ordinarily make three grades, putting all of the heaviest in one, the medium in a second and the small ones in another. This prevents the larger pigs from cheating and crowding the weaker ones and is to be commended. A suitable ration for the growing pigs is made of two parts shorts and three parts corn, where these feeds are available. It may be found profitable to substitute tankage for the shorts in some cases. Tankage is a packing house product of high feeding value. It produces very desirable results when fed in connection with corn. As the pigs get older the proportion of corn may be increased. The growing pigs should have sufficient protein in their food for the production of good bone and strong frames, and it is essential that they be pushed to maturity as rapidly as possible. When it comes to marketing, uniformity in type and finish is important, and as a general rule, the fat hog with broad fat back and good hams is in demand at a premium.

### THE BEST TYPE OF HORSE FOR THE FARMER.

BY PROF. J. H. SKINNER, INDIANA EXPERIMENT STATION.

The American farmer of today owes much to that noble animal, which has been man's friend for centuries. He is not only a necessity on the farm, but adds much to the pleasure and profit of the farmer.

Much has been said of the passing of this patient toiler, but he still exists and doubtless always will have a place in agricultural operations and the commerce of the world. He has held his own against various kinds of motive power and today prices for horses are far better than they were ten years ago.

The horse besides being an important factor in agriculture, deserves consideration for the part he plays in the commercial world. Our great cities with their enormous enterprises demand thousands of horses every year. Foreign countries call on American markets for hundreds of horses each year. All of these must be produced by the farmer, and with very few exceptions by those who do not pay especial attention to the production of horses. Only a few types are produced on farms which are exclusively horse farms. This being true the question naturally arises as to what type of horse is best suited to the farm, or, in other words, what is the best horse for the farmer?

If we were asked to describe the best horse for farm work the task would not be so difficult. But no consideration of this subject should ignore the question of profit to be derived from horses on the farm. In fact, farmers will find about as easy money in a few first-class horses to put on the market as any other branch of his business. Some one must grow the horses for city and commercial use, and no one is better prepared to do it, so far as feed and surroundings are concerned, than the farmer.

Under most conditions farmers cannot afford to lose sight of the profits to be made from this source.

On most farms a few colts can be grown each year very cheaply and with but little trouble. This enables one to dispose of the older horses and thus keep young stock which will be increasing in value. Geldings should never be kept beyond a salable age as mares will be just as serviceable and at the same time produce a colt worth fifty to one hundred dollars.

When we take into account the profits to be gained by such a method and the demands of the market, we will doubtless be led to the conclusion that a farmer cannot afford to produce the horse exactly suited to farm work.

The press is full of discussions on the farm horse and how to breed him. Some recommend one, some another, but most all lose sight of the market value of the animal. Formerly what is known as a general purpose horse was commonly found on the farm, and there are those now who advocate such.

The market, however, does not recognize any such class, and when they go there they are a cheap unclassified horse. For this reason, if no other, they would be unprofitable for farmers. There is, however, another consideration of more importance. Modern agriculture is carried on by the use of heavy implements such as the binder, gang plow, manure spreader and others. These require a great deal of power and consequently a heavier horse than our fathers used.

Market horses may be divided into two main classes: Those for draft purposes, such as heavy draft, 'bus, express, etc., harness and saddle horses, which includes drivers, coachers, and saddlers.

The heavy draft horse must have weight and strength. It is not so much a question of height as weight. A strictly first-class draft horse must weigh 1,600 pounds or more. The greater the weight the greater the value. They must have good feet, legs, plenty of bone, and quality, and where these are complied with good style and action, they command the highest market price. The 'bus and express are of lighter weight and not so strongly built, smoother and have better action. They should not be thought of as *small draft horses*, as they are entirely distinct and different.

A description of harness and saddle horses is scarcely necessary in this discussion as I consider them altogether too light for farm work. Moreover, the average farmer cannot put them on the market profitably. The per cent of high grade roadsters, drivers, and coachers produced from common mares is small and uncertain. The demand for these is poor,

A study of the market shows that a large per cent of the horses that go there are light and unclassified, and as a rule these are cheap and plentiful. On the other hand, horses of the draft types and particularly the heavy draft, find ready sale at good to high prices. There has been no time during the past decade when a first-class heavy drafter would not sell at a profit to the producer. Such horses are demanded by many manufacturers and wholesale merchants at high prices. In the markets today they will range in price from one hundred and fifty to five hundred dollars, depending on the size and quality. Everything considered, this type of horse will be most

profitable for farmers. Some think the light horse, such as used for 'bus and express purposes, better adapted to farmers' conditions, but in his effort to produce the heavy type a sufficient number of failures will result in enough of the lighter type to supply the demands.

The heavy draft horse is the best for several reasons. He can be produced easily and cheaply, requires little attention and is readily broken. Furthermore, he can be used on the farm from two to four years and thus pay his way; blemishes do not detract so much from his sale as in the case of many other types, and he is well suited to the heavy work now found on the farm. It is not my purpose to advocate a coarse, awkward, extremely heavy horse for the farm. A few years ago much was said about the very short legged extremely blocky horse and today such are good sellers, but a far superior farm horse is found in the active upstanding horse of 1,600 pounds and upward with good action and style. Such a horse will not only sell to advantage, but fill the role of farm horse well. He can be taught to walk rapidly and does not know what a load is. Where such are bred and raised on the farm they cost very little and help mightily in making up for the losses from cattle feeding, etc. They can be produced by mating the heavier mares with pure bred draft stallions of any of the leading draft breeds of approved type and quality. With prevailing high prices it may be well to caution breeders against indiscriminate breeding to commoner or inferior sires. Many stallions are being imported annually and among the number many that ought to be rejected by purchaser and breeder. They are bound to leave their impress on their offspring and the farmer pays the price, when after several years the colts come to marketable age.

### THE RANGE STEER AND HIS RELATION TO THE COMMERCIAL INTERESTS OF THE WORLD.

G. W. HERVEY, EDITOR NEBRASKA FARMER.

The range steer, as he is known in the United States, is a native American but of Spanish origin. He takes date of his introduction into the cattle history of the range country, following the war of Mexico with the United States, in which the district of country comprising the present state of Texas became the feed grounds for thousands of cattle from the disorganized and abandoned Mexican herds. Under the demoralizing influences of war these cattle were permitted to roam unguarded into the almost limitless grazing territory of the southwest. In this disorganized condition the cattle of Mexico and Texas became, in a measure, contraband, and for years they knew no owner, and recognized no restraint. Under the favorable grazing conditions of this southern country cattle flourished and the herds multiplied beyond the conception of man, until they were numbered by the tens of thousands.

It was late in the fifties when these roving herds commenced to attract the attention of speculators, but the breaking out of the Civil War in 1861 caused a cessation of cattle interests, and for about six years but little account was taken of the semi-wild herds on the Texas plains. Then followed a period of miracles. "The creation of cattle kings," when in

a night, in the twinkling of an eye almost, the ambitious cattle rustler was made the owner of a herd. The gathering of cattle and branding became a business or occupation, and extended into all districts where unbranded cattle were to be found. This fascinating employment did not cease even when the unowned herds were exhausted, but all through the range cattle history of the west there has been unceasing effort exerted in the attempt to reform the indiscriminate operator of the branding iron.

The driving of these herds north to unoccupied grazing lands and to meet a market among dealers and speculators who were then becoming interested in the cattle trade was in active operation in 1867, and has continued to be a feature of traffic to the present time. Among the Nebraskans who were early engaged in the range cattle industry might be named Wm. A. Paxton, Edward Creighton, Shidley Bros., Ex-Governor James E. Boyd, Keith & Barton, Tressler Bros., George Perry, Adams & Reddington, Swan Land & Cattle Co. These firms operated on the west side of the state, with headquarters mainly at North Platte, Sidney and Ogallala, the herds ranging north and west, often visiting the Niobrara and Minnakaduza Valleys on the extreme north side of the state. The largest cattle deal made in Nebraska in those earlier days of range cattle operations was a sale made in 1872 by James E. Boyd to Wm. A. Paxton, in which 4,200 head of cattle changed hands.

About this time the homesteaders moving onto the frontier settlements in Kansas and Nebraska, introduced the native farm bred cattle of the states east of the Missouri, and gradually improvement commenced in the long-horned cattle of the range. Each year found an increased interest among cattle owners to breed down the horns and breed up the beef qualities of the range steer.

During the past thirty years as the cattle herds have spread north and westward over this immense arid district of the United States west of us, they have been exerting civilizing influence that could not have been employed by any other means. Man, in his efforts to follow the herds into greener pastures, encountered privations and hardships, sacrificed the advantages of civilized life, little dreaming that through his efforts that a wealthy and prosperous empire would spring upon the western side of the United States, in a district of country that had no alluring temptations to place before immigration. A country known only as a wild, barren waste, where even the adventurer had little to excite curiosity. But here nature had planned the home of the range steer and as his numbers increased and his superior beef qualities became known to the world, capital and business enterprise invited him to the feed yards of the great corn country of the Missouri Valley where at first he was received with much hesitancy on the part of feeders as to his disposition to confinement and his aptitude in conforming himself to prepared feed conditions. All efforts at making the range steer a failure and driving him out of competition with the native farm bred animal, however, proved futile. The march forward towards the highest attainment in beef quality has marked the history of the range steer during the past fifteen years. What the range

steer has accomplished as a finished beef animal is fresh in the minds of the reading public. In the fat stock shows of the country the range steer, in carload lots, stands in the front, side by side with the best cattle that blood, feed and care can produce.

As evidence of the growth and development of the range cattle industry, a few figures on the cattle population of the country will best serve to illustrate. Designating all that section of the United States west of the Missouri as the range country, commencing on the north with the Dakotas, then Nebraska, Kansas, Indian Territory and Texas, as the east line, we have within these bounds the original and present territory devoted to the production of the range steer. In 1850 the cattle population of all this vast district of country, omitting Texas and California, was only 87,322 head. The same territory, including California and Texas, has now more than 30,000,000 of cattle, fully one-half of all the cattle in the United States. Texas is the most remarkable division of range country in its increase of cattle production. In 1850 its cattle population was 336,114 head, in 1860 it had increased to 3,535,765 head, making a gain in this ten year period of 3,199,654, or an average annual gain of 95 per cent. Texas had in 1900, 9,428,196 cattle, an increase of 9,092,082 over its number in 1850, showing an average annual gain for the 50 years of 54 per cent; no district of country in the world can exhibit such marvelous cattle development.

Less than twenty-five years ago this vast district of range country to the west of us, including the Dakotas, Nebraska, Kansas, Indian Territory, and west to the Pacific coast had only gotten fairly started in the cattle business. The census returns of 1880 shows a cattle population for this district of 4,927,605, while in Texas alone had 4,084,605. almost as many cattle as all the balance of this great division we have designated as the range cattle country. This gave a total for this division in 1880 of 9,011,617 cattle. In 1900, twenty years later, this district west of the Missouri showed an increase of 21,000,000, an average annual increase of 12 per cent for the twenty years from 1880 to 1900, while the entire district of the United States east of the Missouri was only 9,000,000 increase, or an average annual increase of 1 4-5 per cent, showing that the range steer had not only the advantage of being cheaply produced, but has found favor with the meat consumers of the world.

The range steer, from his habits of life, from the nutritious wild grasses that he feeds on, and the inherited qualities of his Spanish-Mexican ancestry, is peculiarly fitted for the range. The introduction of pure bred sires of the best types of the improved beef breeds of cattle, has so changed the beef properties of the range steer that in recent years he is not discriminated against by feeders, and when he comes from the range in his matured form is a very desirable animal with the packers. The range steer is on the ascendency all along the line, his reputation as a beef maker is no longer called into question, as a money maker he is just as safe and sure as a national bank.

The influence that the range steer is exerting on the commercial interests of the world is varied and widespread. The demand that he has created

for improved blood has added millions of dollars annually to the revenue of the fine stock breeding industry; the place that he is filling in the meat supply of the world can be estimated only upon a fair credit of the production of the range, which is much more than is produced on the east side of the Missouri. This will show more plainly when we understand that the range is a breeding and producing district, carrying almost entirely breeding cattle and stock cattle of feeding ages. The export trade in these range steers being largely to the feed yards in the states east of the Missouri, where in periods of enumeration they help to swell the cattle population of those districts. Aside from the importation of bulls for breeding purposes, the range country is strictly an export district in its cattle trade, and receives no advantage in population out of what other cattle raising sections produce.

The millions of cattle that leave the range each year go directly to the packing houses, or stop for a season in the feed yards in the corn districts, to be finished into a higher quality of beef. Thus it is observed that the range steer, though produced in obscurity, becomes one of the strong, prominent commercial factors in business. The extent to which the range steer is felt in his commercial importance cannot be approximately figured. It is safe however to say that so extensive and important has become the beef supply of the United States, that the destruction of our range cattle industry, (where more than one-half of the steer cattle of the entire country are produced), would at once create a beef panic throughout the markets of the world. Since the range steer has become so closely allied to our commercial interests, any influence that will operate against the successful prosecution of this industry, reverts to the detriment of the whole country.

### COMMERCIAL ORCHARDING.

This old subject has been discussed so many times that I hardly deem it advisable at this time to go into details as to the preparation of the soil, planting, cultivation and care of the orchard, but take a brief look at the condition of orcharding in this country and see where we are at.

When, in consulting government reports, we note the large number of apple trees planted in these west-central states in comparison with the small yield of fruit, we at first wonder why, but we readily see that this is due, largely, to a great per cent of the trees being under bearing age. The yield and quality is materially reduced by the depredations of the codling moth, apple scab, etc., which are allowed to develop unmolested and even aided to a great extent by rubbish and filth which is allowed to accumulate in the poorly attended orchards, which furnish breeding places and shelter for apple enemies. Then, further, the rough and tumble way in which the apples are picked and put on the market does cap the climax and complete the year's job in our Nebraska orchards. However, I firmly believe this type of orcharding has seen its best days; that it will never again perch on that lofty pinnacle of satisfaction that it has in the past. The time has come when the orchard must be looked after as carefully as other parts of the farm. The

man who lifts the mortgage from his farm by producing pork must surely keep the cholera from his herd; must daily watch it and see that no disease whatever creeps in. This hog is unwell and must be removed and have special treatment. That one must have a little extra feed, and probably the whole bunch must undergo a course of medicine to bring them into the best of thrift. The owner knows that all this must be looked after with the greatest of care or failure is certain. He must know his herd much better than the average orchardist knows his orchard.

Yet we all point to the hog as the great mortgage lifter, and justly so, yet we all understand that in order to succeed he must have the above care and attention.

The orchard has been too much of a secondary matter. We are too apt to expect first-class returns with second-class care. Were we to fondle and nurse our orchards like they do on the Pacific Coast and in the irrigation districts of Colorado, Utah, etc., no doubt the returns would be very satisfactory. In those sections they are largely driven to special farming because they cannot quite cope with us in the production of the standard meats and grains. We are in too good a country here for rapid development in orcharding. All we have to do is to tickle the soil and can grow anything we wish in the line of an annual crop, and harvest it and get the returns in one year. The lazy man despairs of raising an orchard because it requires the expenditure of too much time and energy, yet, he will grow grain, potatoes, etc., as a matter of necessity. The nervous, impatient man tires of waiting ten or twelve years for good returns from his orchard, while he is reaping a crop each year from the balance of his farm. Thus we can readily see that it is only the patient, tree-loving person, who studies his orchard and gives it needed attention the same as other parts of his farm, who will attain the highest degree of success. I believe the appearance of the orchard plague will prove a benefit to the good orchardists because he will get a better price for his first-class product, thus getting large returns for good, intelligent labor, and letting the sluggard reap as he sows. He who wishes to grow apples for market and yet does not care to be continually bothered with marketing them, should plant the entire orchard to only a few varieties. Then when a variety is ready to pick he will have enough worth while, and the large buyer will seek him instead of him being compelled to seek the market.

Winter varieties are preferable for such a grower as they are not so perishable and can be sold more readily in large quantities. However, the specialist should have apples ripe for the earliest market, with a succession of varieties throughout the entire season. By encouraging the early market the summer and fall apples will be found to be very satisfactory. For the last three or four years ours have been even more satisfactory than the winter varieties. They are apt to be more free from worms, and, in fact, nearer free from any defect and require less grading.

The apple is easily deserving to be crowned king of all fruits and the United States grows the best the world produces, which fact the old countries are rapidly finding out. Our export trade is proving this. The Central States



are furnishing thousands of barrels for the European countries. Portions of Nebraska have already proven to be as good apple-producing districts as any part of the Central States. The apple orchard has come to stay. I firmly believe it will return more profit in the future than it does now or has in the past. At home the old orchards have been very satisfactory and there is no reason to believe the young orchards will not do as well. We have kept track of one of our young orchards, an eight-acre tract planted in the spring of 1893. It was planted on the hit and miss plan, about thirty-four by thirty-six feet with fillers both ways, containing a thousand trees. We cropped to corn and beans the first three years. The fourth year cultivated with no crop. The fifth year cultivated in corn. The sixth year it was cultivated the fore part of the season and mowed the latter part. The remaining years it was mowed three times each summer, allowing the grass and weeds to lie on the ground. The value of the corn crops have balanced the labor to date, leaving the first cost of the trees and the rent of the land to be paid by the fruit. Expense: Eight acres of land at \$3.00 per acre, \$24.00 per year. Eleven times \$34.00, \$264 for the eleven years, plus \$100 the value of the trees when planted, to be paid by fruit. There was no fruit accounted for until the year of 1899, when we picked and sold 100 bushels, \$75.00. In 1900, 150 bushels, \$110. 1901, 250 bushels at an average of 80 cents, \$200. In 1902, 800 bushels at 65 cents, \$540. In 1903, 1,200 bushels at 65 cents, \$780. Total \$1,705, minus the indebtedness, \$364, equals \$1,341, and the orchard is just coming into good bearing. However, we have begun thinning already and in three or four years expect to have the orchard reduced to about 550 trees. They will then stand about 17 by 36 feet apart and our intention is to leave it that way. We have also kept account the past four years of a certain part of a 21 year old orchard, planted for family use. This part contains 13 Ben Davis, 5 Utter, 5 Wealthy, and 1 Windsor. The Ben Davis in 1900 yielded 120 bushels, in 1901, 60 bushels, in 1902, 95 bushels, in 1902, 180 bushels. Total 455 bushels. Five Wealthy, 15 bu., 55 bu., 13 bu., and 60 bu., respectively. Total, 143 bushels. Five Utter, 72 bu., 9 bu., 24 bu., and 85 bu., respectively. Total, 190 bushels. One Windsor, 9 bu., 13 bu., and 10 bu., respectively. Total, 40 bushels in four years. This makes a total of 828 bushels off the 23 trees in four years, or 207 bushels per year, or 9 bushels per tree. This shows what can be done when everything is favorable. The location is ideal for a fruiting orchard, being high land with good air drainage. Good windbreaks on the south and moderate the balance of the way round. We simply mowed the grass and weeds two or three times per year and allowed them to remain on the ground; cut away the watersprouts and broken limbs and sprayed thoroughly twice each spring.

I believe these yields could be duplicated in other orchards in our neighborhood, with the same care. It was such yields as these that induced us to plant commercial orchards.

G. A. MARSHALL,  
Arlington, Neb.

## THE SILO AND THE FARMER.

DR. H. P. MILLER, SUNBURY, OHIO.

*Gentlemen:* I feel some hesitancy in presenting a subject to you that I know you do not think of interest at this stage of Nebraska farming. I appreciate the courtesy through which I have been placed first upon the program, a program of themes appealing to you so strongly that you are here in spite of the injection of this theme.

Were I not sure the introduction of the silo upon Nebraska farms would mean the conservation of vast wealth that you are now producing, I should yield to my feeling, that you are averse to having this krout barrel of the truck patch farmers urged upon.

Prof. Smith, in introducing his theme of the balanced ration yesterday, cited the consternation that would arise among stockmen were one animal out of each four fattened for market to be swept away by disease. Yet, said he, the equivalent of that is going on upon the vast majority of Nebraska farms through failure to produce that fourth animal because feeds are not properly combined. I believe what he said is true, that the country at large is losing 25 per cent of its feed through lack of knowledge as to how to use it to best advantage.

Just here I want to congratulate you upon having a man at your agricultural school with such clear insight into the feeders' problems and the ability to work out the product that challenges the world.

The first fad upon which the claim of the silo to your consideration is based, is that in addition to the 25 per cent loss to which Prof. Smith has called your attention, a proportion of your great crop variously estimated at from 33½ to 50 per cent is scarcely being fed at all.

You say it is not worth the handling. But you are thinking of the time when prairie hay could be had for the cutting, when land values did not figure in the cost of feeds, and when the corn crop had to be harvested in the primitive way known to the American Indian. But those conditions have all passed, but passed indeed so recently and so rapidly that you have hardly been able to adjust yourselves to the new conditions.

The new realization which above all others my visit to your state has impressed upon me is that there is no longer any "West," where the mammoth stores of the ages are man's simply for the gathering. Your free prairies are gone. The accumulated fertility of unnumbered centuries that needed only to be scratched with the lister to be made to yield up gorgeous crops of golden grain is gone. Henceforth what you get you must work for just as we do in Ohio. Your land is valued higher than in my home country yet your crops are no larger, nor more certain than on our farms where the owners have come to think of thin soil, not as a mine but as a laboratory.

The father whose daughter has come home with a beau for the first time is bewildered. He has not realized that his child has developed into a woman and he is still thinking of her as a child.

Your standing corn stalks are evidence to me that you have not awakened to the realization of the changes that time has wrought in your conditions.

Corn fodder is worth more per acre than prairie hay. There is now machinery by means of which and horse power it may be handled as successfully as any other crop, thus reducing the labor involved so that it is made a really economical feed. The corn harvester and the silo are to the corn crop what the cotton gin was to the cotton industry.

Ensilaging corn saves practically all of, puts it into a palatable and digestible form at least, cost per acre for harvesting, and preparing for feed, also at least cost for storage and puts it into most convenient form for feeding to all kinds of stock except hogs.

It is, however, pre-eminent as a cattle feed. They eat it all, and thrive upon it as upon blue grass pasture. A dry corn stalk is not a tempting morsel, but take that stalk at just the moment of maturity, when its sugar content is at its highest and preserve it in its own juice, and you have yellow peaches with sugar and cream for the cattle in contrast with dried peaches with the skin on.

But you argue, that will do for the little farmer of Ohio with his band-box herd of Jersey cows. To this I reply that I think our average in the eastern part of your state, moreover, that the silo is not confined to our smaller dairy farms, but is in use by some of our largest cattle feeders.

True, our farmers do not have as large a proportion of their land in corn as do you, but they do not need to when they utilize all they do grow.

A man with whom I have been associated since coming among you and who has traveled much over your state tells me that half the tillable land of the four eastern tiers of counties is in corn each year.

The silo would enable you to cut that area down one-third, under a conservative estimate. Were the labor bestowed upon the smaller area of corn, putting it largely into silos and devoting the land withheld from corn to alfalfa, there is no doubt that twice the number of cattle could be maintained, than are at present. The incidental advantages that will follow the introduction of the silo are many.

Your cattle will be fed under shelter, and the manure sowed and this I am sure must soon be as imperative for you as for the eastern farmer.

If your wheat and oats will not stand it, your clover and corn and alfalfa will.

Then in the belt of sufficient rainfall this rapid removal of the corn crop will encourage a short rotation of crops, in which wheat will follow corn, thus lessening the cost of wheat production. It will relieve your glutted corn market and give a better balance to your farm operations.

Mr. Miller then gave a description of a hundred ton silo that he said could be built for \$50.00.

#### ORNAMENTALS FOR OUTDOOR PLANTING.

To make a success of ornamental plants and shrubbery, it is necessary, first, to so arrange the trees as to give the plants room; for it is useless to attempt to grow plants, shrubs or even small trees where they are overshadowed by larger ones. Large growing trees, such as elms, maples, sycamore, linden, red oak, catalpa, and pines, may be planted along the border

or in the rear. For the foreground plant birch, mountain ash, tree lilacs, red bud, blue spruce, cedar, and the weeping varieties of willow, ash, mulberry, or birch.

I wish to emphasize the importance of planting small growing trees a suitable distance from the stronger ones. For example, a cedar or spruce growing by itself or grouped with others of its kind, makes a pretty tree; but when sandwiched between larger trees that overshadow it, it soon becomes a scraggy disfigurement to the landscape.

When you wish to plant shrubs or plants, enough space should be reserved to prevent the surrounding trees from robbing them of moisture. You had better have a small ornamental garden well tended than a large one half starved. Do not plant a little, weak paeonia, snowball, rose, or other perennial plant in a strong bluegrass sod and expect it to start off readily without care. The soil must be tilled around that plant for several years.

Following is a list of hardy shrubs which have been successfully grown in our locality:

About the first to appear in the spring is Forsythia, which clothes itself in a mass of yellow flowers in April, before the leaves appear, and is closely followed by the red and yellow Flowering Currant. Then comes the Lilacs, too well known to need description, and which may be had in many varieties, with double and single, white and purple flowers.

Cydonia—Japan Quince, may be had in several colors, conspicuous among which is Cydonia Japonica, with its blaze of red blossoms which open before the leaves appear.

Prunus Sinensis—Double pink flowering Almond should be in every collection.

Spireas may be had in varieties blooming from early spring to autumn. One of the most beautiful of these is Spirea van Houtteii, which in June bears a perfect mass of white flowers.

Viburnum Opulis Sterilis—Common Snowball, is too popular to need recommendation.

Following it is the beautiful fragrant white flowered Syringa, or Mock Orange, which flowers in June.

The Tamrix is prized for its fine feathery foliage and graceful bows, which are tipped with pink flowers in July.

Hydrangea Paniculata Grandiflora makes a grand September bloomer, if given rich soil and plenty of moisture.

Among the successful climbers of this locality are Akebia Quinata, Virginia Creeper, or five-leaved ivy; Clematis Paniculata, Clematis Jackmanii, Clematis Henryii, Honey Suckles, Yellow Trumpet, Scarlet Trumpet and Halliana; Aristoclochia Siphon—Dutchman's Pipe, Wistaria. Roses—Crimson Rambler and Prairie Queen.

For hedges or screens one may use Barberry, California Privet, Japan Quince, Spirea, Golden or Van Houtteii, or Arbor Vitea.

A few hardy herbaceous plants will repay the care they require.

Archilleas in varieties, from four inches to four feet high, furnish numerous small, white, yellow and red flowers from June till frost.

The double Hollyhocks, in their many brilliant colors, make splendid backgrounds for flower beds.

The Columbines seem to be had at home any where, and may be had in many distinct and striking varieties.

The varieties of Iris are numerous. The common blue shades are very hardy and of remarkably easy culture; but the many varieties of Iris included in the groups Iris Cermanica and Iris Kempferi furnish flowers of immense size, of every color and shade and unparalleled in beauty. The latter, however, require good cultivation and plenty of moisture.

The Paeonies have received such a thorough and merited advertising by the paeonia specialists that it is useless for me to try to add anything in the way of praise for these popular flowers.

Of hardy Phlox, the new and showy varieties are constantly increasing through the hybridizer's skill, until now the range of flowering period is very wide, extending from the first early spring blooms of the dwarf forms of Phlox, continued through the summer by the beautiful blooms of Phlox Suffruticosa, while in autumn we have the grand heads of blooms produced by the tall and brilliantly tinted varieties of Phlox Decussata.

Dianthus—Pinks, Bleeding Heart, Hibiscus, Crimson Eye, Rudbeckia or Golden Glow, and Yucca Fillamentosa are worthy of places in the garden.

Most hardy deciduous plants should be planted either in the fall, after the leaves drop, or as early in April as possible, usually about from April 5th to the 10th. (In our latitude it is a mistake to wait until Arbor Day to plant any deciduous stock.) If a shrub is taken from cold storage to the garden after its leafing time the hot sun of the advanced season causes it to leaf quickly, before it has made roots enough to sustain its top, and it wilts, and perhaps dies, during the first dry spell. Then the grower gets the blame, though the fault is often with the customer for being late about making his purchase. When shrubs are set their tops should be pruned back in proportion to their loss of roots. Roses should be pruned to five or six buds. In subsequent years roses should be pruned in March. Hydrangeas and other late flowering plants which flower on the new growth, may be pruned early in the spring; but spring flowering shrubs, or those which flower on the old wood, should not be pruned until they are out of blossom.

Many plants which are hardy in snowy climates are often winter killed here by frequent freezing and thawing. Such plants should be mulched in December, or as soon as the ground is well frozen.

Hardy perennials supply the demand for cheap and permanent flower gardens, but many prefer to invest a little more and have an immediate effect. For this there is nothing equal to summer budding plants. Plant them far enough apart to permit working the soil as soon after each rain as the condition of the soil will permit.

The numerous new productions of Cannas, Geraniums, Colours, Lantanas, etc., have brought these plants rapidly into prominence for ornamental work.

Nothing gives a more tropical effect than a bed of Cannas. They may be massed in one color, or arranged in a round bed with a group of tall, bronze-leaved, red flowered plant in the center, surrounded with green

leafed yellow or spotted flowered varieties, and outside of this another row of dwarf growing red or pink Cannas, either in bronze or green varieties. If a green leafed variety is used the bed may be beautifully finished off with a border of bright colored Colous, which may be trimmed to any desired height or form.

The many bright and variegated varieties of Colous, often called Foliage, are very useful and attractive for borders and flower-bed designs, or grouped by themselves.

Geraniums are, and always will be, the leaders among bedding plants, because of their continued show of flowers through the entire summer. New varieties with larger flowers and brighter colors are constantly being produced. They flower most freely when moderately dry. Liberal cultivation is better for them than frequent watering. Very pretty effects may be had in mixed flower beds, using for the background Hibiscus, Paris Daisy, Salbia, or Colous. In front of these may be used Carnations, Lantana, Snapdragon, Geraniums, Stocks, Vincas, Petunias, and Heliotropes with a sprinkling of Gladiolus and Tuberose. For a border use low growing plants, such as Verbenas, Ageratums, Lobelias, Centaurea, Cnaphalium, or Alternanther.

Pansies appear best planted in a bed by themselves in a partly shaded place, where they can have plenty of moisture.

E. W. AND W. A. DOLE,  
Beatrice, Nebraska.

## HOW TO CARE FOR THE DAIRY COW.

BY L. D. STILLSON.

Dairying, or the system of making money from the milk and cream from the cow, is based upon her maternity. Man, by appropriating the milk of the cow, designed by nature for the preservation and growth of the calf, is rearing to his advantage the motherhood of the cow, and to make her yield greater quantities of milk, richer in fat, is his greatest aim. In so doing, by breeding and feeding, he is making her more or less an artificial creature.

Successful dairying upon the proper recognition of this fact, and so caring for the cow as to make her produce the greatest amount of human food at the least possible cost and still keep our machine—the cow—in the best possible condition, is the aim of every true dairyman.

The cow has a different system of converting her food into human food from that of her big brother, the beef steer. The steer converts his food into fat and places it in layers just under the skin and between the muscular fibers of his body, storing it up to be used as fuel if need be, or to be sold as beef when his carcass goes to market. The dairy cow will eat heartily of the food we give her, not to create fat to store upon her own body, but to create milk for the maintenance of her calf. Food given her at night will be digested and converted into milk ready for the youngster's breakfast. By her process of assimilation she converts our cheap forage into a highly nutritious human food, much cheaper than the beef steer.

The condition of the dairy cow is such, by her system being so relaxed by

the animal production of a calf, and further by the daily drain upon her for milk, that she must be so cared for as to best withstand the changes of weather, especially in winter. To be most profitable and yield wholesome milk she must be comfortably housed in a well lighted and well ventilated stable, where the temperature never falls to freezing. Here she should be as well taken care of as possible, for on her comfort depends, in a large measure, the owner's profit. Her stall should be kept clean and well bedded so as to keep her clean. She should have plenty of fresh water, and never ice cold, or she will take some of her butter fat to heat it with.

We must recollect that our cow is an artificial creature, which takes our rough feeds and transforms them into a palatable finished product, so we must see that she has plenty of raw material with which to do her work. She must be fed and watered regularly, so that she will not waste time and energy worrying when her next feed will come. She should always be treated with kindness. The dairyman should never curry the cow with the pitchfork, nor pound the milk out of her with the milk-stool. Whenever the attendant is in a swearing mood, he is not a fit companion for the dairy cow, and he should at once "go back and sit down" until he is in a better humor. He should never swear in the cow-stable any more than in the kitchen in the presence of his wife.

There are many men who still follow the old-time custom of having their cows all become fresh in the spring. In our own work we find that we can secure at least 1,000 pounds of milk per cow more by having them become fresh late in September or October. We can then carry a good flow of milk through the winter into the spring with its green feed, giving a very even continuous flow nine or ten months. Then the cow has a much needed rest just when heat, flies, and short pasturage cuts the milk flow most.

As to feeds and how to feed—each person should study a little for himself. If we are after the greatest flow of milk, irrespective of cost, we would say wet or steam all dry food and grind all the grain. It is a matter of doubt with us as to whether it pays to grind feed for a healthy, active cow. The returns however, may not be quite so large when the food is not ground.

The cow has a good sized dinner basket and we prefer to feed only twice a day, leaving her free to rest, and re-chew the food already given her. She soon learns when to expect her food and is content until near the time.

As to her care before calving. Her food should be somewhat reduced in quantity, and of a cooling, laxative nature. Roots, silage, alfalfa hay, and shredded corn fodder are excellent for roughage. Oats, bran, or a little oil meal are good as concentrates. After calving, only tepid water should be given for at least a couple of days. Keep her in a dry warm boxed stall and see that she gets no sudden chill for several days.

When a dairyman has gone to the expense of cows, stables, land, utensils, etc., for dairy work, he must keep one principal well in mind. That is, that about sixty per cent of all the feed a cow can eat goes to her maintenance, and that he must make his profit on the balance of what she eats. With this in view he can very readily see that he must be liberal with his feed if he will make the most from his investment. He should watch his

feeding very carefully and know of a certainty that he is feeding all his cow will stand. By carefully weighing his milk at every milking, then by carefully weighing or measuring the feed, he can increase his feed just so long as there is a corresponding increase in milk, but he should watch closely for the dangerous point of over-feeding, and drop off a little. He will soon surprise himself with results.

One-half the Nebraska cows are star boarders. Some from natural tendencies, others from want of proper care and feed. An old saying was that "a good dairyman always had good cows." In this there is a great deal of truth for it indicates good care, good feeding and careful selection. Many of us call ourselves dairymen when in fact we have not yet left the kindergarten stage. Because we own some cows and milk twice a day, look wise and let our wives take a little butter to the store to trade for tea, coffee and tobacco, we are not dairymen.

"This world does move," and the dairymen must move with the rest. He must keep step to the music and be willing to be a learner. He should mark progress on his stable door, get out of the rut and study well his care of the cow and her surroundings. Learn what to feed and how to grow her feed at the cheapest price possible. Balance her ration with brains, settled with common sense and seasoned with kindness. Then and not till then, will he be on the best road to success.

### THE DUROC-JERSEY AS THE FARMERS' HOG.

ADDRESS DELIVERED BEFORE THE DUROC-JERSEY SWINE BREEDERS' ASSOCIATION JAN. 18, 1904, BY W. P. SNYDER, UNIVERSITY OF NEBRASKA.

*Mr. President, Breeders, and Friends of the Duroc-Jersey:*

The farmers' hog is the common-sense hog. It is the hog that will give the largest return for ordinary care and feed under ordinary conditions on the ordinary farm. The hog must adapt himself to conditions as they exist on the farm; the farmer will not change his conditions to suit the requirements of any particular hog. If the hog must have a fine house with glass windows and modern ventilators, and a balanced ration figured with mathematical accuracy, the farmer will refuse to recognize it as his hog. It is the duty of the hog to take what he can get and make the best of it. The hog that performs his duty faithfully will win the reward. The reward of merit is given for economy and equality in production. Let it be understood then, that the *Farmers'* hog must be able to conform to conditions as they exist on our farms.

Any fancy point that does not carry with it market value counts for nothing. The farmer does not care whether his hog dresses in a coat of red, white or black, or in one of many colors, but he demands that the coat be fine and show quality. It makes no difference to him whether his hog carries its ears erect or allows them to lop down over its broad forehead, but they must be small or medium in size and thin, showing no indication of coarseness. A few black hairs or a few white hairs cause him no worry. A swirl or cow-lick detracts nothing. Form and quality are all that he sees.



The hog that possesses these two requirements may wear its hair curled if it desires. The farmer does not care.

The type that suits one locality may not suit another. The Canadian farmer breeds the bacon type. He is producing hogs that fulfill the requirements of the English market. However, there is one quality that applies to all conditions alike, that is fecundity. The sow that produces eight pigs and raises them well is worth much more than twice the value of the sow that produces but four. One of the chief difficulties confronting the farmer is that of getting a sufficient number of hogs. There are but few farmers who could not feed more pigs if they had them. It is very little more work to feed a car load than a small lot. Much of the profit comes in feeding large numbers. Fecundity, then is one of the chief requirements of the farmers' hog.

When the farmer has the pigs in his possession he wants them to grow rapidly and to carry a fair amount of flesh. But to increase in size requires food of a nitrogenous nature. Our one grain product for stock food is corn. It is not suited to the needs of the growing animal. Protein is required for the production of muscle and bone. If the Nebraska farmer supplies this in grain he must buy mill products. These are expensive and require cash at the time when money on the farm is scarce. If the pork is to be produced economically, much of the growth must be made on forage crops. The best known of these is alfalfa. The farmers' pig must be able and willing to go out into the pasture and hustle for much of its food. The exercise that it gets while doing this increases its appetite and vitality. A pig may be so compact, chubby and lazy that it will not leave the pen in search of food. It may not know how to forage. Its ancestors may not have been accustomed to foraging. Such a pig does not suit the Nebraska farmer. Anything, man or beast, that lives in the west, must hustle. Hustling seems to be a law of our state from which nothing is exempt.

The pig must be able to make good gains on alfalfa or other forage crops, with a medium grain ration, and, when put into the feed lot, lay on flesh with amazing rapidity. Then it is the pig that will consume and assimilate the largest amount of grain that will meet the farmers' approval. Vitality, the result of exercise and proper food, count in the fattening pen. The pig whose digestive system has not been injured with carbonaceous feed will eat more corn and get more nutriment out of that eaten than the pig that has been fed to the limit for some time on concentrated food. The chief value of judicious foraging is reaped after the pig is put on a full grain ration.

When the hog is ready for the market it must show quality. The pig that will dress out the largest percentage of the most profitable meat will command the highest price. *Quality* is even becoming a more important factor in meat production. The hog that is largely lard does not command the price that it did some years ago. Few people relish fat as a food. Most people prefer a mixture of fat and lean in all kinds of meat. The American consumer is demanding leaner meat and smaller hams and shoulders. Breakfast bacon is in greater favor among the American people than ever before.

The higher prices are paid for the smaller hogs. The average weight of the hogs sold in the Omaha market in the year 1902 was 220 pounds. That is six pounds less than in the year previous and thirteen pounds less than in the year of 1900. The farmers' hog at the present time must be able to attain the weight of 200 or 225 pounds at the age of six to nine months. It must do this largely on forage crops and corn after the first ten weeks, and in the end it must not be a lump of fat.

The hog must accomplish a great amount of work in a very short time. This requires a vast store of innate energy and vitality. No hog suffering from any inherited weakness can stand the strain. This constant crowding taxes the endurance of the most vigorous and healthy. Vitality counts, and it is dependent upon breeding as well as upon care and feed.

Summing up what has been said we find that the Farmers' Hog should possess certain qualifications. These are suitably to conditions as they exist on the average farm, prolificacy, early maturity, quality in production, the habit of foraging, the power to stand forced feeding and a great store of inherited vitality with no constitutional weakness.

In how far does the Duroc-Jersey meet these requirements? The Duroc-Jersey has always been a farmers' hog. It has never known any conditions other than those existing on the average farm. It has never been the pet of the fancier nor the instrument of the speculator. It has always been a common, every-day plodder winning its fame strictly on its own merit. Other breeds have suffered from the effects of a boom. Certain sires have sold for fabulous prices and as a result their descendants to the fourth and fifth generations have been coveted and used without any regard to their individual qualities. Animals have been used that had no qualification other than that they traced back to some animal that sold for a fabulous price. The Duroc-Jersey has never suffered from such a boom. The sires have been chosen because of merit rather than because of any inflated values. All the history of the breeds shows that the Duroc-Jersey has always been a farmers' hog and has stood on its true worth and merit. The color has been against it in many instances. This is the color that has taxed the skill and care of the breeders of the Berkshire and Poland China to eliminate from the black color of their favorites. Yet, with all the prejudice that existed against the red color the Duroc-Jersey has fought its way into public favor until it is unsurpassed by any breed.

The natural conditions under which it has been kept, the variety of stock from which it has originated and the process of selection to which it has been subjected all tend to maintain vigor and vitality in the breed. These red hogs have not been subjected to dainty care nor close breeding. They have been obliged to hustle for a living much of the time. They originated not many years ago from various sources. The selection has always been toward refinement. The vigor and prolificacy of the large loosely built frames of their ancestors have not deserted them. Exercise, natural conditions, judicious selection and proper food have tended to preserve these qualities.

The Duroc-Jersey is still undergoing selection toward refinement. Refinement is obtained at the expense of vitality and fecundity. The develop-

ment of this breed is approaching the form which has the necessary refinement with the desirable qualities common to coarser breeds. The value of further selection toward refinement is very likely to be over-balanced by loss of vitality and other desirable qualities. No individual can possess all the desirable qualities to an extreme extent with none of the undesirable. The Duroc-Jersey has come to the point where it possesses nearly all the desirable characteristics that a breed may possess without having the opposing undesirable. I do not say that it has all the desirable and none of the undesirable qualities, but that it approaches such a condition as nearly, if not more nearly, than any other breed, for the Nebraska farmer.

It is difficult to determine what breed matures the earliest or gives the largest return for the feed consumed. By choosing certain types one may conduct an experiment and get whatever results are desired. Type counts for more than breed in the feed lot. But where breed tests have been conducted the Duroc-Jersey has been on a par with the other breeds in regard to early maturity, economic increase, and any other points compared.

Each breed has its own points of especial merit. Conditions vary so much and types within breeds vary so materially that one might be rash to say that any one breed is superior to all others. But the Duroc-Jersey has many points in its favor. It is not suffering from the results of too close breeding or artificial conditions. It retains much of the vitality common to animals that are not so far removed from nature's ways. The breed has never suffered the evil effects of a speculative boom. The typical form is that which insures good breeding qualities and good foraging and feeding qualities with early maturity and constitutional vigor. It is not developed to an extreme in any direction. It is an all-around, common-sense, farmers' hog. So long as it retains these qualities it will hold its present place on the farm. But if any point of value is sacrificed for one of fancy, the Duroc-Jersey will lose one of the points that commend it to the farmer. *Utility* must even be the ideal. The farmer will not long breed hogs that are delicate, lazy, too fine of bone, too short in the body or too long in the legs.

The common-sense hog that combines fecundity, vigor or constitution, a wonderful appetite, and early maturity, with a form that is pleasing to the eye of the farmer and butcher will be the farmers' hog regardless of color or name.

#### PRESIDENT'S ADDRESS.

BEFORE THE IMPROVED STOCK BREEDERS' ASSOCIATION, BY PRESIDENT WM. ERNST, OF GRAF, NEBRASKA.

The great wheel of time has been slowly effacing some of the careless methods of doing the duties pertaining to our special vocations, and as the speed increases we see in no instance a more marked and steady progress than in the improvement of live stock, which has become an absolute necessity. Our land is now too valuable and labor too expensive to raise scrub stock of any kind.

The pure bred sire has some wonders for the workman and farmer. What can be accomplished with a pure bred sire and balanced rations has been

fittingly demonstrated to the world at Chicago's great stock show by this, our Station; we all have a reason to feel proud of their success.

The success of our University means our success if we earnestly strive for it. Our Station has again accomplished more with less expenditure of money, than any other experimental station in the Union.

Improved farming goes hand in hand with improved live stock, and well it may, for the two are a paying combination, so much so, that one is dependent on the other.

Do you think our work finished when the grades have been succeeded by the pure bred stock? We must improve our full blood herds and flocks by more careful selections and better foods for feeding.

We should not content ourselves by putting in telephones and free mail routes and call this improved farming. Let those modern improvements be the means of keeping in close touch with the Experiment Station and the advanced methods of farming.

I am not a pessimist, but want to give you all a warning. Let us quit robbing our soil, let us not try to get rich at the expense of our children and grandchildren. Don't feel offended, and if any one present has fully kept up the fertility of his land he is exempted.

Today, in many eastern states in order to raise a crop, they must spend half the crops' value for artificial fertilizers and we are fast drifting to the same conditions, but we have a preventive, that is, rotation of crops and abundance of pastures and meadows for our improved live stock.

### CORN IMPROVEMENT IN NEBRASKA.

*Mr. President and Gentlemen of the Corn Growers' Association of Nebraska:*

Your secretary has assigned to me the subject of the "Progress of Corn Improvement in Nebraska." I shall not attempt to discuss this from a scientific point of view, but from observation and picture.

My first crop of corn raised in Nebraska was in 1867. Having just left the army I had no thought of seed until the time to plant it. Then I inquired of my neighbors and took such as I could get which consisted of four varieties, white, yellow and red, and each of these crossbred to as many other kinds and colors so that at husking time I had a combination that was good if not perfect.

What was true in my case was so of most others at that time. The question was not often asked "What kind of corn have you?" but "Have you any corn that will grow?"

Soon men discovered that some corn would yield more to the acre than others, and that some varieties ripened before others, so selections were made of such as the farmer thought suited his purpose best. Improvement in corn only went so far as to select the best ear for seed. No one thought of breeding corn of a pure type.

The selection of seed corn was in a crude state. Every one practiced the method of his father. Some selected the seed in the field, taking the earliest ears that ripened and braiding them in bunches, then hung them in

the smokehouse, shed, barn, or on the limb of a tree. Others waited until spring and took out of the pile when time to plant.

For the latter reason corn often failed to germinate and a replant was required. Then the farmer took what he could get and the process of crossbreeding went on again. After a few years catalogues from seed houses began to reach the farmer's house. They pictured to him and told him of a wonderful variety the possession of which would make him rich in a few years, but when he tried these marvelous wonders he found about the same medley of varieties, and learned that they advertised what they did not have and sold what they did not advertise.

A few men in the state and some seed houses tried to grow and sell pure bred corn of some variety, but the number was so small that the carelessness of the farmer and the ease with which corn is crossbred, nullified most of such efforts. Up to a few years past there has been little systematic effort made to breed pure bred corn in this state.

Now a new light has appeared. The agricultural press, that great, forceful educator of the people, has taken it up. The chemical laboratories are analyzing its properties and multiplying its uses. The experimental stations are giving instructions in breeding and cultivating it. The press is sowing broadcast useful and practical knowledge, while the spirit of corn improvement is taking possession of the corngrowers.

The seed houses have done some good in the distribution of seed corn so far as germination qualities are concerned, but little so far as purity of breeding. The new method of selling seed corn on the ear in crates is no improvement.

Corn is like cattle. It must have its pedigree-bred in, not printed. Every farmer knows that in an ordinary field of corn several types of ears may be selected. The selection of a uniform lot of ears from such corn may look fine and pleasing to the eye, but they will disappoint the purchaser. He will find at harvest time that all of the same types and shades of color in any one of them that were in all of them, and perhaps many others.

Progress in corn improvement in this state has been more in cultivation than in breed. Step by step we have advanced from the double shovel and walking twice in a row to riding and cultivating three rows at once, and from planting with the hoe to the perfect horse planter. The progress of corn improvement in this state has made much headway when the spirit of progress demands and creates an organization for that purpose, and this Association has sprung from that demand. The earnestness and determination with which this Society enters upon its duties is a guarantee that progress will be more rapid in the future than in the past.

JOSEPH HALL,  
Tekamah, Neb.

#### PRESIDENT BLODGETT'S ADDRESS.

*Fellow Breeders of Nebraska:* I feel it somewhat my duty as President of this Association to say a word regarding the progress made by us during

the past year, and I would like to recommend a few things I deem important for this Association to consider at this session.

As breeders of first-class hogs the state of Nebraska stands in the forefront, and we find that a great many breeders from other states have purchased breeding stock from some of our best breeders during the past year, many inquiries coming from Iowa and others from Wisconsin and Ohio as well. That we have been breeding a superior animal is evident by the fact that the hog that won first and seventh prizes at the Iowa shoat fair last year did not even get a place when he came in contact with our Nebraska-bred hogs.

I wish also to call your attention to the fact that Nebraska-bred animals made a creditable showing for their state while out on a circuit at other fairs, and they usually get what they go after. Reports of the Iowa, Missouri, Kansas, and other state fairs, including Ann Royal, shows this to be facts.

We find that the breeders in our state are not contented to stand still but are ever on the watch to improve the herd, and this is what is making this state one of the greatest hog states in the country.

During the past year we have had some very satisfactory sales. The prices on the whole have been very good. It is true we did not make any \$1,700 sales, but we have made sales that in the future would do good not only to the breeder but to the purchaser as well. This leads me to believe that the future has much in store for the breeders of this state.

I deem it important for this Association at the annual meeting to ask and insist on the Nebraska State Board of Agriculture to provide in the future for the proper disinfection of all pens at the State Fair. I think that every day all pens should be thoroughly disinfected, thereby lessening the risk of our stock collecting diseases.

Another recommendation I would suggest is that proper and adequate facilities be had for shipping and loading stock after the fair is over. Last year many of our breeders were compelled to wait in the rain and mud for half a day for cars and many of them were unable to return home before Monday on that account. It seems to me all this could be avoided.

I believe the future looks bright for the hog breeders of Nebraska. No other animal has done more for this or other states than the mother of the pig. She has lifted the mortgage from many a home, and when everything else fails she is ready to come forward and make her owner prosperous and the state richer by her presence on the farm. I report that she is the old standby. If we stay with her she will stay with us, and she will do in the future what she has done in the past.

REUBEN E. BLODGETT,  
Beatrice, Neb.

#### DISEASES ARISING FROM IMPROPER PRUNING.

C. E. BELL, YORK, NEBRASKA.

It is not my intention to deal with pruning in its various phases, but I

will endeavor to make it my business to show the results of different pruning and more particularly of careless pruning.

Wounds result to trees from many different sources than from pruning, as from animals rubbing, etc. The wounds in these cases are just as serious and many times are the source of the same disease as those resulting from pruning. We will only consider those made by the pruning proper.

We are apt to think that because a tree does not cry out when injured as a person does that it is not greatly hurt and that it does not react. The tree responds to every injury and the stronger the tree the stronger the resistance. And what we want to do is to put ourselves in such position that we will aid this resistance. This probably can best be brought out by showing how the opposite is done. There are four common cases of careless pruning. First, a branch is cut leaving a stub of various lengths, from one to five inches or even more. Second, a limb is cut from above and in pulling off peals the bark for several inches. Third, the breaking off of a branch, leaving a jagged surface. Fourth, dead branches are left on a tree, or what is commonly called natural pruning.

It is not that vitality is lost by those careless methods of pruning, but that a part of the wood is left exposed. The tree immediately responds. It is a conifer, resin is allowed to escape from the ducts and soon hardens into a crust on exposure to air. Among the hard woods, as soon as a limb is cut, the heart and sap wood are exposed to the air. These, as you all know, have no power of healing in themselves. The growing tissue of the tree is confined to a very small portion, just underneath the bark, called the cambium, which is held in check by the bark. Now as soon as you cut the limb, you relieve the pressure on this growing tissue, the cambium, and an excessive growth takes place, covering the wound with a mass of tissue, commonly called callous. The end of the old stub remaining as sharp and distinct as ever. This process takes considerable time, varying with the size of the limb cut. Thus in the first case mentioned, of a stub being left, the callous tries to cover the stub up and even if it is able to do this, in which case the stub must be very small, it will require considerable time to do so. The wood then exposed dies, cracks and checks. The surface collects the dust which with the dead cells make a thin soil in which germs find lodging and sufficient moisture for their germination and growth. It is a small beginning but soon forms better conditions for wound rot. Bacteria are prominent in this first slow process of weathering but later, as decay penetrates deeper, are only secondary. They seem to prepare the way for fungi mostly of the toadstool kind which can be seen on almost any decaying log. The fleshy parts seen are produced at the surface for the reproduction of spores, their reproductive bodies, while the plant proper is beneath the bark or within the tissues. (See examples.) The fungus spores are blown by the wind and after finding lodgment as described, germinate. This germination consists in sending out a few delicate threads from the spores. These threads enter the moist decaying parts, branch considerably and at first confine themselves to that part which is already dead. As they get stronger and well established, they induce decay of

themselves. They gradually cause the conditions for the entrance of more air and moisture which in turn prepares the way for the fungus threads to grow farther. This way entrance is forced to the trunk and then extended indefinitely throughout the trunk. These fungus threads, by means of certain chemical changes extract the necessary food matter from the plant cells and in return a complex chemical change is brought about in those fibres. These changes brought about by fungus are commonly spoken of as rotting. They destroy the mechanical properties of the wood, which is thus ruined commercially, and if not cut will soon blow over and become a breeding place for other diseases and insects. Wood, however, in the early stages of decay, may be used as a low grade of timber. And in some cases may make very good posts, as the fungus stops growing after the tree is cut. A good example of this is the soft rot of the catalpa (*Polyporus versicolor*). The trees attacked appear to be in the best of health and until the tree is pretty well decayed the presence of the disease can only be recognized by the holes left by rotting branches. Later, after the vegetated fillments of the fungus have extracted a sufficient amount of nutritive material, the fruiting bodies appear on the bark of the old stub. (See examples.) Where the holes are of considerable size it is almost certain that the tree is unsound. Ants and boring beetles soon make a complete hollow. Woodpeckers easily remove the pulpy decayed wood. The fungus changes the heart wood into a soft spongy mass, completely destroying the wood as far as the decay extends, while the tree is standing, and making it incapable of withstanding any strain. But if the catalpa is cut while the disease is in an early stage, it can be used for posts, as the growth of the fungus stops when the tree is cut. The same fungus is found on many other trees and as countless thousands of spores are discharged each every year, the chance of infection is shown to be very great, as the spores float about freely in the air. The rate of decay has never been accurately established, but large areas have been known to be infected and rendered useless within fifteen years. Even after the wound is covered the fungus threads may continue to extend themselves into the wood, reaching the heart and causing the trunk to become hollow.

I found one box elder tree along one of the Lincoln streets in which a dead stub had decayed and fallen away, leaving a hole considerably larger than your two fists.

There are a great number of these toadstool fungi, some being peculiar to a single species. Thus it would hardly pay in a discussion of this kind to take up the minute discussion of each.

The second and third cases of careless pruning mentioned, that of peeling the bark and leaving a jagged surface, are simply cases of the rougher the surface the greater the likelihood that disease will gain an entrance, the same as in the human body. If a surgeon leaves a ragged, shattered bone uncovered, disease of some kind is naturally expected. But in surgery, bacteria is about the only danger. Then how much more dangerous in pruning where the patient is subject to bacteria, various kinds of insects and many fungi? Thus a man who leaves a jagged stub in a tree is no less



a criminal in nature's eyes than a surgeon who leaves a shattered bone uncovered, is in the eyes of the law. The fourth case, that of natural pruning. The limb becomes weak because the shade is too dense. It is then robbed of its share of food by the limbs above, and it dies. It is then a source of danger to the tree, particularly those trees upon which the branches stay a long while after dying. Insects and diseases, as described above, gain entrance to this branch which may render worthless the whole tree. Ants, termites and many beetles prepare the way for fungi. Old trees when pruned are more subject to disease than younger ones which are more vigorous. This is illustrated by the fact that later in their life all trees become infected.

#### REMEDIES.

The most effective remedy would be the removal of conditions which favor infection. This is easiest done by avoiding any unnecessary wounding of the plants or trees and the immediate treatment of any wounds rendered necessary in pruning or other operations. Dressings or applications to the wound cannot directly hasten the healing process, they may aid it by preventing decay and thus save the tree. The surgeon applies an antiseptic to prevent contamination. Thus in pruning we must apply a dressing to prevent disease and let nature do the healing. The dressing, according to Baily, must have two properties, first, it must check the weathering of the wound, second, prevent growth of bacteria and not injure the cambium and bark. It must be protective and an antiseptic. Paint and tar are very durable. Bordeaux is sometimes used while coal tar is strongly recommended, especially for forest trees, by Prof. VanSchrang of the Department of Agriculture. If the decay has just started it may be stopped by removing all discolored tissue and closing the cavity, soaking with an antiseptic before and after putting in the plug, which will then heal over. Pruning in the fall or winter allows the tar to be absorbed by the surface of the wound, due partly to the diminished amount of water in the wound during autumn and partly to the consequent negative pressure of air in the tree. When pruning in the spring or summer, the tar altogether fails to enter the wood, cracking and making the same entrance for insects and disease that the wood would have done without being covered.

#### CONCLUSIONS.

When pruning is necessitated make the cut close, injuring the wood no more than absolutely necessary. Then cover with a protective and an antiseptic solution.

## EXPERIMENTS WITH DAIRY HERD.

PART I. THE HERD RECORD.

PART II. RATION TESTS FOR DAIRY COWS.

PART III. THE BEST WEEK IN A COW'S LACTATION PERIOD.

BY PROF. A. L. HAECKER, NEBRASKA EXPERIMENT STATION.

### PART I.

#### THE HERD RECORD.

The dairy herd was founded in October, 1896, by the purchase of ten grade Jersey heifers. These young heifers were all about two years old and due to calve in the late fall and early winter. As but a small amount of money was set aside for the purpose of this herd, it was found necessary to obtain animals at a nominal cost, and the ten heifers were purchased in southern Wisconsin and delivered in Lincoln at \$32 per head. The breeding of this herd can be described briefly as follows: Full-blooded Jersey sires of the same family were used on native stock for several generations, thus producing high grade Jerseys of similar breeding and type. Aside from the ten heifers, two animals were obtained from local parties and were bred differently, one being a full-blooded Jersey, and the other a crossbred with Jersey dam and Shorthorn sire.

From the day the herd arrived at the Station, careful records were kept of each individual, not only as to milk and butter production, but also as to amount and weight of food consumed and weight of animal. In order to obtain accurate weights, the animals were weighed each Monday morning before being turned to water, thus avoiding variation caused by large and small amounts of water consumed. Each milking was weighed and a sample taken of the same immediately after milking. The milk was tested by the Babcock method, and each week's production was recorded as a separate unit in the record book. Under this method it was possible to obtain a weekly balance as to the cow's performance and her condition.

During the five years covered by the records, many changes were made in the herd as new animals were purchased and some of the old ones sold. Different breeds and grades were introduced, but not with the intent to carry on a breed experiment. However, the aim was to select representative specimens of each class.

In the following tables a year constitutes a lactation period within the limits of twelve consecutive months after the cow's calving. The amount of "estimated" butter is determined from the butter fat by adding the regular one-sixth overrun to the butter fat. In order to avoid a great number

of figures, the entire record of each member of the herd is condensed and the totals for the year are given.

TABLE I.—*Herd record in milk and butter for 1897.*

Name of Cow	Milk	Fat	Butter	Breed of Cow
	Lbs.	Lbs.	Lbs.	
Annie. ....	6977.25	313.39	365.62	Grade Jersey.
Cora. ....	8073.82	352.32	411.01	" "
Diana. ....	5357.92	267.59	312.19	" "
Eloise. ....	6172.56	293.43	342.32	" "
Gertie. ....	5169.35	254.83	297.30	" "
Hattie. ....	5784.80	273.79	319.42	" "
Io. ....	4742.68	208.47	243.21	" "
Juno. ....	5213.08	238.58	278.34	" "
Mabel. ....	5734.70	247.09	288.27	Shorthorn-Jersey cross.
Ruth. ....	8074.22	473.24	552.11	Jersey.
Total. ....	61300.38	2922.73	3409.82	
Average. ....	6130.04	292.27	340.98	

All the members of the herd in the year 1897 were heifers with their first calf, except the Jersey cow Ruth, which was three years old and with her second calf.

TABLE II.—*Herd record in milk and butter for 1898.*

Name of Cow	Milk	Fat	Butter	Breed of Cow
	Lbs.	Lbs.	Lbs.	
Annie. ....	6907.19	314.64	367.08	Grade Jersey.
Bess. ....	7528.30	373.78	436.08	" "
Cora. ....	7302.15	313.26	365.47	" "
Diana. ....	6536.70	328.51	383.26	" "
Eloise. ....	6912.10	337.23	393.44	" "
Gertie. ....	5584.81	284.26	331.64	" "
Hattie. ....	5527.45	268.56	313.32	" "
Io. ....	5702.56	259.52	302.77	" "
Juno. ....	5711.36	259.53	302.78	" "
Mabel. ....	7535.21	329.12	383.98	Shorthorn-Jersey cross.
Ruth. ....	6385.69	409.73	478.02	Jersey.
Total. ....	71633.52	3478.14	4057.84	
Average. ....	6512.14	316.19	368.89	

The record for 1898 shows the best average of any in the five years' tests.

This can be explained largely by the favorable condition of the herd. They were all in their second lactation and in the best of health, while they received rather heavy rations during the winter.

TABLE III.—*Herd record in milk and butter for 1899.*

Name of Cow	Milk	Fat	Butter	Breed of Cow
	Lbs.	Lbs.	Lbs.	
Annie. ....	5250.39	251.85	293.82	Jersey grade.
Cora. ....	7099.52	295.92	345.24	" "
Diana 2d. ....	4971.66	261.10	304.62	" "
Eloise. ....	5529.47	251.49	293.40	" "
Fannie 2d. ....	4188.86	246.29	287.34	" "
Hattie. ....	6936.74	329.53	384.46	" "
Juno 2d. ....	1278.76	52.77	61.55	" "
Katheleta. ....	3977.25	138.65	161.74	Hereford grade.
Lill. ....	4407.47	159.37	185.93	Shorthorn grade.
Mabel. ....	6954.86	310.10	361.78	Jersey-Shorthorn cross.
Mabel 2d. ....	3446.74	171.66	200.26	Jersey-Shorthorn cross.
Olive. ....	3668.55	134.21	156.58	Hereford grade.
Ruth 2d. ....	3402.92	210.58	245.67	Jersey grade.
Sady. ....	4332.99	150.93	176.07	Hereford grade.
Total. ....	65446.18	2964.45	3458.46	
Average. ....	4674.73	211.74	247.03	

During 1899 many changes were made in the herd, as, the introduction of new cows and the disposition of some of the original animals. The cows Katheleta, Lill, Olive, and Sady were range cattle obtained in western Nebraska and had not only beef breeding, but a natural tendency to fatten when well fed.

The herd made its poorest record this year as a result of the above animals and the cow Juno 2d, which made a very poor yearly record.

The cows Annie, Eloise and Fannie 2d, aborted at seven months, which also caused a shrinkage in their records.

TABLE IV.—*Herd record in milk and butter for 1900.*

Name of Cow	Milk	Fat	Butter	Breed of Cow
	Lbs.	Lbs.	Lbs.	
Cora.....	7088.90	298.68	348.46	Jersey grade.
Diamond.....	2772.25	157.78	184.08	Jersey.
Diana 2d.....	2447.36	142.32	166.01	Grade Jersey.
Hattie.....	5963.23	265.46	309.66	" "
Mabel.....	7779.70	318.60	371.70	Shorthorn-Jersey cross.
Nymph.....	5062.96	253.33	295.55	Jersey.
Ruth 3d.....	4546.38	240.54	280.57	"
Total.....	35660.78	1676.71	1956.03	
Average.....	5094.39	239.44	279.35	

Through lack of barn room the herd was greatly reduced in 1900, and but seven complete yearly records were obtained.

The cows Diamond and Diana 2d were in poor health, which made it necessary to dry them off at six months after calving.

TABLE V.—*Herd record in milk and butter for 1901.*

Name of Cow	Milk	Fat	Butter	Breed of Cow
	Lbs.	Lbs.	Lbs.	
Bessie McKinley.....	8518.90	292.37	341.10	Holstein-Friesian.
Cora.....	7319.00	321.10	374.61	Grade Jersey.
Diamond.....	7065.10	373.44	435.66	Jersey.
Diana 2d.....	5434.10	288.54	336.63	Grade Jersey.
Hattie.....	6828.50	309.17	360.70	" "
Mabel.....	9419.10	402.50	469.58	Shorthorn-Jersey cross.
Maude.....	9789.20	332.54	387.96	Holstein-Friesian.
Ruth 3d.....	7481.20	298.98	348.81	Jersey.
Snowflake.....	3380.80	179.61	209.54	"
Whitelick.....	4048.23	231.13	269.65	"
Total.....	9284.13	3029.38	3534.29	
Average.....	6928.41	302.94	353.43	

In the year 1901, two Holstein-Friesian cows were added to the herd—Bessie McKinley, five years old, and Maude, two years old, with her first calf. The cow Snowflake, which was 12 years old, failed to be a profitable producer. Mabel, the crossbred Shorthorn-Jersey, made her best record during this year, giving 9,419.10 pounds of milk in eight months.

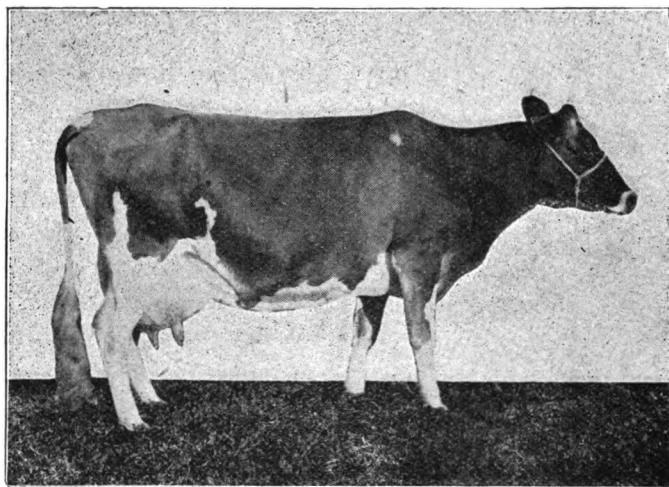
TABLE VI.—*Total and average production of herd for past five years.*

Year	No. of cows in herd	Total milk produced	Average milk per cow	Total butterfat produced	Average butter fat per cow	Total butter produced	Average butter per cow
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1897	10	61300.38	6130.04	2927.73	292.27	3409.82	340.98
1898	11	71633.52	6512.14	3478.14	316.19	4087.85	368.89
1899	14	65446.18	4674.73	2964.45	211.74	3458.46	247.03
1900	7	35660.78	5094.39	1676.71	239.44	1956.03	279.35
1901	10	69284.13	6928.41	3029.38	302.94	3534.29	353.43
Average of 52 yearly records .....		5833.17	.....	270.70	.....	315.82	.....

The results obtained from this herd are not abnormal and can be equaled if not surpassed by any farmer or dairyman in Nebraska. No effort was made to crowd or force any animal to a high record, but on the contrary they were fed light rations, and, very often to their disadvantage, were changed suddenly from one feed to another as the character of the feeding experiment might demand. The young stock were principally disposed of in the form of veal, but exceptional heifers from some of the best cows were saved. It will be seen from table VI that the average of fifty-two records were as follows:

Milk.....	5,833.17 Lbs.
Butter fat.....	270.70 "
Butter.....	315.82 "

This includes an average of all the members of the herd, which contained both good and poor producers. It might therefore be interesting as well as instructive to single out a few of the members that made the best records and also others that made the poorest records.



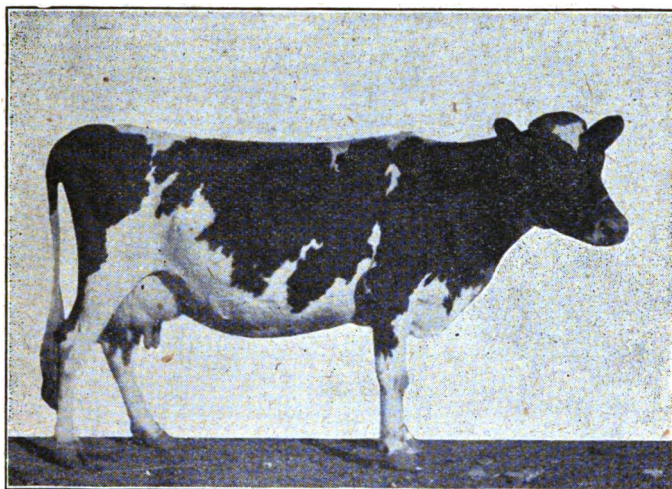
CORA.

TABLE VII.—Record of the cow Cora, a high grade Jersey.

Year	Milk	Butter fat	Butter
	Lbs. .	Lbs.	Lbs.
1897.....	8073.82	352.32	411.04
1898.....	7307.15	313.26	365.47
1899.....	7099.52	295.92	345.24
1900.....	7088.90	298.68	348.46
1901.....	7319.00	321.10	374.61
Total. ....	36888.39	1581.28	1844.82
Average .....	7377.68	316.25	368.96

The cow Cora was born November 1, 1894, which makes her eight years old this fall, and it is safe to say she is in her prime. She came fresh August 6 and is now giving eight pounds butter fat per week. Cora is a small cow weighing on an average 725 pounds and is a most economical butter producer. A good example of type is shown by contrasting the cow Cora with Juno 2d, a cow of similar breeding but very different in form. Cora is wedge shaped as viewed from side and top, and has a deep, well-developed barrel, but at the same time light shoulders and withers. On the other hand, Juno is steer-like in build, with heavy shoulders, and is narrow through barrel.

The mammary glands, especially the milk veins, in the cow Cora are exceptionally well developed, branching in several veins before they enter the abdominal wall. She has light bone and is fine in quality, perhaps too much so, for she has difficulty in holding her own in the herd, being timid and adverse to fighting. She has been a regular breeder, dropping a healthy calf every year from the time she was two years old, and keeping in the best of health. She is no doubt a very profitable cow and will probably continue to be so for some years to come.



HATTIE.

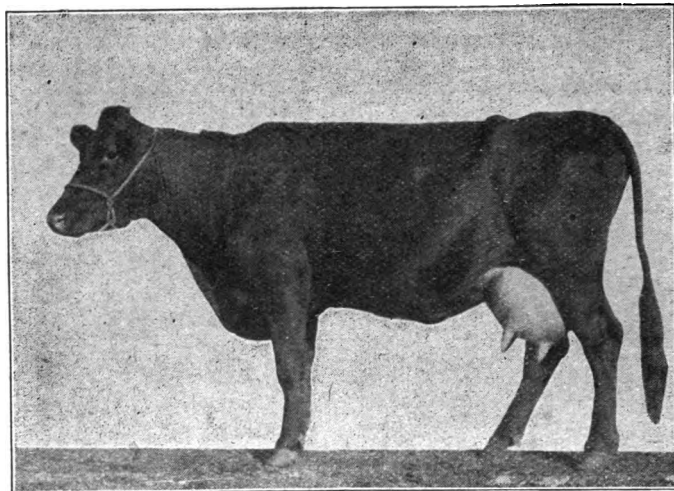
TABLE VIII.—Record of the cow Hattie, a high-grade Jersey.

Year	Milk	Butter fat	Butter
	Lbs.	Lbs.	Lbs.
1897.....	5784.80	273.79	319.42
1898.....	5527.45	268.56	313.32
1899.....	6936.74	329.53	384.46
1900.....	5963.23	265.46	309.66
1901.....	6828.50	309.17	360.70
Total.....	31040.72	1446.51	1687.56
Average.....	6208.14	289.30	337.51

The cow Hattie is bred very much the same as Cora, but has a little Holstein-Friesian blood several generations back, which accounts for her black



and white color. She is a little more rugged than Cora and is coarser of bone, but has much the same type. Hattie weighs on an average about 750 pounds. She is also in her prime and is making her best record this year.



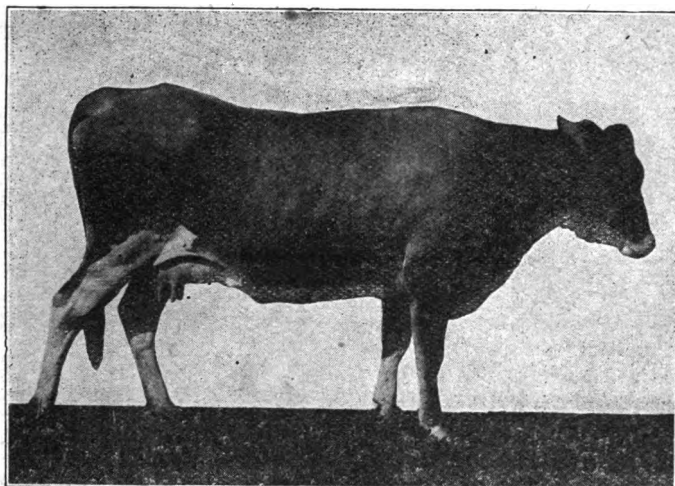
MABEL.

TABLE IX.—*Record of the cow Mabel, a crossbred Jersey-Shorthorn.*

Year	Milk	Butter fat	Butter
	Lbs.	Lbs.	Lbs.
1897.....	5734.70	247.09	288.27
1898.....	7535.21	329.12	383.98
1899.....	6954.86	310.10	361.78
1900.....	7779.70	318.60	371.70
1901.....	9419.10	402.50	469.58
Total.....	37423.57	1607.41	1875.31
Average.....	7484.71	321.48	375.06

Mable shows her Shorthorn blood in size and color, weighing about 950 pounds and having a dark red color, but she gives a rich flow of milk, in this respect resembling the Jersey.

She has the best five-year record of any cow in the herd as may be seen by a comparison of the tables, giving her highest yield in 1901. She is at the present time giving a large flow and promises to make her best record this year.



JUNO 2D.

TABLE X.—*Record of the cow Juno 2d, a grade Jersey.*

Year	Milk	Butter fat	Butter
	Lbs.	Lbs.	Lbs.
1899.....	1278.76	52.77	61.55

The cow Juno 2d makes a contrast to the other animals shown, but offers a good example of poor type for dairy purposes.

Dairymen, look out for the Juno 2ds! They are expensive to keep and worse to breed from.

TABLE XI.—*Record of the cow Ruth, a full-blooded Jersey.*

Year	Milk	Butter fat	Butter
	Lbs.	Lbs.	Lbs.
1897.....	8074.22	473.24	552.11
1898.....	6385.69	409.73	478.02
Total.....	14459.91	882.97	1020.13
Average.....	7229.95	441.48	510.06

As the record of the cow Ruth is exceptionally good, it is given here. This cow has a fine dairy type and large capacity. She unfortunately died after her second year and we are not in possession of her picture.

## PART II.

### RATION TESTS FOR DAIRY COWS.

During the past few years the dairy industry has received much attention throughout the entire State and in western counties, where but a few years ago dairying was practiced to a very limited degree, we now find a progressive enterprise. This condition has no doubt been greatly stimulated by the establishment of markets for both milk and cream. Through the development of the skimming stations and the hand-separator system, milk, and especially cream, can be marketed as a farm product at nearly any railway station in the State. With the increased interest in dairy husbandry, much information has been called for regarding native foods and the feeding of them to dairy cows.

#### ALFALFA VS. WILD HAY.

The chief grasses used for hay in the State are alfalfa and prairie grass or wild grass. These are generally fed as roughness in the feeding seasons and many farmers either have an abundance of each kind or can obtain them with little difficulty. The question as to which hay is the best for milk and butter production is therefore an important one to dairymen.

#### PLAN OF THE EXPERIMENT.

On January 1, 1902, after the dairy herd had been on dry feed for eight weeks and were in a normal feeding condition, twelve cows were selected and divided into two lots. In making the division, care was taken to have each lot about equal as to production of milk and and butter fat.

Lot I was put on a ration of alfalfa hay and Lot II on wild hay. Besides all the hay they could eat up clean, each lot received 16 pounds of beets daily and a small grain ration of one-half bran and one-half corn by weight.

One lot was fed alfalfa and the other wild hay for six weeks and then changed about, Lot I getting wild hay and Lot II alfalfa for another period of six weeks.

#### RESULTS.

At the end of twelve weeks the experiment was closed with the following results:

TABLE XII.—*Alfalfa vs. wild hay for dairy cows.*

	Milk produced	Butter produced
Period I.	Lbs.	Lbs.
Lot I. Six cows fed on alfalfa hay for six weeks. ....	5082.40	268.35
Lot II. Six cows fed on wild hay for six weeks. ....	4962.29	260.75
Difference in favor of alfalfa hay. ....	120.11	7.60
Period II.		
Lot I. Fed wild hay for six weeks. ....	4760.20	241.32
Lot II. Fed alfalfa hay for six weeks. ....	4780.34	243.12
Difference in favor of alfalfa hay. ....	20.14	1.80
Lot I. Lost in changing from alfalfa to wild hay. ....	322.20	27.03
Lot II. Lost in changing from wild hay to alfalfa. ....	221.95	17.63
Difference in favor of alfalfa. ....	100.25	9.40
Lots I and II when fed alfalfa hay produced:		
Lot I. First six weeks. ....	5082.40	268.35
Lot II. Second six weeks. ....	4780.34	243.12
Twelve cows produced in twelve weeks. ....	9862.74	511.47
Lots I and II when fed wild hay produced:		
Lot II. First six weeks. ....	4962.29	260.75
Lot I. Second six weeks. ....	4760.20	241.32
Twelve cows produced in twelve weeks. ....	9722.49	502.07
Difference in favor of alfalfa hay. ....	140.25	9.40

The decrease of milk and butter production in the second six weeks of the test was largely due to the natural shrinkage from advance in lactation, but it will be noticed that the shrinkage was greater when wild hay was fed.

When lot II was changed from wild hay to alfalfa in the starting of the second six weeks, they were at a disadvantage, having been reduced in the first six weeks' test. It is therefore safe to assume that alfalfa gave even better results than is shown in the above tables.

The quality of both alfalfa and wild hay was the best, the latter being exceptionally fine as a result of the dry season of 1901. The animals in both lots had free access to water and salt during the experiment.

It required a little more wild hay than alfalfa hay. This was due to the larger per cent of waste in the former.

In live weight the animals changed but slightly, showing a slight increase when on alfalfa.

In conclusion, it is evident from the results of the experiment that normally cured alfalfa hay is more conducive to milk and butter production than wild hay.

## CORN ENSILAGE VS. SUGAR BEETS.

It is well known among feeders of dairy cattle that green or succulent feed is favorable to milk secretions, and a suitable substitute for grass during the winter season is an important factor in the ration.

Corn silage and beets are the most common crops used as succulent food stuffs during the feeding period, and to find if possible the comparative value of the two was the aim of the experiment.

In the winter of 1897, after the herd had been on dry feed for four weeks they were divided into two lots, of five in each, the lots being equal as to milk and butter production.

Lot I was given 30 pounds of sugar beets per day, while Lot II received the same amount of corn silage. The balance of the ration was composed of 10 pounds alfalfa hay with a grain ration made up of two parts oats, two parts corn, and two parts wheat bran, and was fed according to the capacities of the cows, ranging from six to ten pounds per day.

The experiment lasted for five weeks, at the end of which time the records showed the following results:

TABLE XIII.—*Results of five weeks' feeding test with sugar beets and corn silage.*

	Milk	Butter fat	Butter
	Lbs.	Lbs.	Lbs.
Period I.			
Lot. I. Production of five cows for five weeks before test when fed on ensilage.....	3212.50	154.30	180.01
Lot. II. Production of five cows for five weeks before test when fed on ensilage.....	3083.30	148.60	173.37
Difference in favor of Lot I. ....	129.20	5.70	6.64
Period II.			
Lot. I. Five weeks on ensilage .....	3040.60	147.20	171.73
Lot II. Five weeks on sugar beets.....	2819.20	137.20	160.07
Difference in favor of Lot I. ....	221.40	10.00	11.66
Difference between Lots I and II, Period I.....	129.20	5.70	6.64
Difference in favor of ensilage .....	92.20	4.30	5.02

In forming the two lots, it was impossible to divide them so that they would be equal in milk and butter fat production. It was therefore thought advisable to give record of Period I, which was the result of the five weeks before the test started.

In Period II, which comprised the time covered by the test, a natural shrinkage took place in both lots, due to advancement in lactation. Lot I, it will be seen, produced a little more milk and butter fat than Lot II, but only a very little more compared with the time required and number of animals used. This test, then, shows a slight difference in favor of corn

ensilage, Lot I producing 92.20 pounds milk and 5.02 pounds butter more than Lot, II, the beet fed lot.

This difference might be accounted for by the variation in the individual animals through the many conditions that effect dairy cows. The test, however, was made during very favorable conditions of weather and good health of all the animals in the test. The herd was uncommonly uniform, all being two-year-old heifers with their first calf.

As to the quality of the food given, the sugar beets were of average grade, while the corn silage was good, all moldy, side or top silage being rejected and only the good ensilage fed.

As to the relative cost of production, corn ensilage is certainly much cheaper than the sugar beet, but the former requires expensive machinery for cutting and a silo for storing, while sugar beets need only be put in a place where they will not freeze. Ensilage will keep until fresh grass comes in the spring, while it is difficult to keep sugar beets after the last of March.

#### CONCLUSION.

While corn ensilage gave slightly better results than sugar beets when fed to dairy cows, the difference was so small that it is safe to say they are quite equal in feeding value.

#### PART III.

##### THE BEST WEEK IN A COW'S LACTATION PERIOD.

It is often of much importance to know at what time in a cow's lactation she is liable to make her best record. Nearly all of the associations of our improved dairy breeds favor the animals making large milk or butter records. In some cases certain fixed standards are set, as, for example, in the American Jersey Cattle Club Association, where fourteen pounds or over of butter is required to admit animals to what is known as the tested "list."

In looking over the herd records it was found that a great variation existed as to the best week of lactation. This variation was not only among certain individual cows but it also existed with the same cow from year to year.

In order to get reliable data it was quite evident a large number of records would be required to overcome the varying influence and find a fair average. Minnesota Experiment Station was therefore called on to co-operate with the Nebraska Station, and they were able to furnish 155 records. This, combined with 84 records from the Nebraska Station, gave a total of 239. Out of this large number of carefully compiled records the following table and results are drawn.

It was found that nine-tenths of the cows made their best records during the first ten weeks of lactation and that over one-half made their best records during the first month.

The first week is calculated beginning four days after calving, thus making the end of the first week eleven days after calving.

TABLE XIV.—*Best milk and butter weeks during lactation periods of 239 cows.*

<i>No. of cows in station.</i>	
1st. _____	6 Cows.
2d _____	
3d _____	
4th _____	
5th _____	32 Cows
6th _____	23 Cows
7th _____	12 Cows
8th _____	9 Cows
9th _____	6 Cows
10th _____	6 Cows
Later than 10th week	2 Cows
	22 Cows
<hr/>	
1st. _____	8 Cows.
2d _____	
3d _____	
4th _____	
5th _____	27 Cows
6th _____	21 Cows.
7th _____	14 Cows
8th _____	12 Cows
9th _____	6 Cows
10th _____	5 Cows.
Later than 10th week	4 Cows
	52 Cows
	61 Cows

Milk, 239 cows.

Butter, 239 cows

29 Cows

It will be seen from this table that the greatest number of cows on experiment made their best milk flow the third week, while the best butter production was made in the second week.

#### CONCLUSIONS.

From the results obtained in this test, which bid fair to be average, the the second and third weeks of a cow's lactation are the best, and there is not much difference between the two.

A cow reaches her highest production of butter fat at an earlier period than she does her greatest milk flow.



## EXPERIMENTS IN THE CULTURE OF SUGAR BEETS IN NEBRASKA.

BY PROF. T. L. LYON AND A. T. WIANCKO, NEBRASKA EXPERIMENT STATION.

The co-operative sugar beet experimental work upon the farm of the Standard Cattle Company at Ames, Nebraska, during the season of 1902, was in part a continuation of previous work where conclusive results had not been obtained, and in part a test of methods of culture and combating disease that had not previously been under investigation. All the work was laid out with a view to solving problems in which the farmer or beet grower was particularly interested. As in previous years, the liberality of the Cattle Company made it possible to carry on the work on an extensive scale, and over 200 acres of selected land was used for the experiments. Most of the work was conducted upon what would commonly be termed a deep, friable loam, very uniform in physical character and fertility. This almost absolute uniformity of the soil upon the fields made it possible to use very much larger plants than would ordinarily be admissible without danger of varying the conditions.

The season, on the whole, was rather favorable to the development of the sugar beet. At no time was there a lack of moisture. On the contrary, the middle of July was rather wet, and this condition was probably responsible for the unusual prevalence of the "leaf spot" disease later in the season. As to temperature, the season was somewhat below normal and did not present the frequent extremes of heat of other years.

### TESTS OF VARIETIES OF SUGAR BEETS.

In this test twenty-eight varieties of sugar beets were used, including three lots of home-grown seed from the 1901 crop. The field used was a medium loam soil which had been deeply fall plowed after a crop of oats. The ground was disked early in the spring with a view to saving moisture. The seed-bed was prepared just ahead of the planter by thorough "double-disking" followed by a straight-toothed harrow, which in turn was followed by a roller having a light harrow attached to slightly roughen the surface. In this way a fine moist seed-bed was secured.

Planting was begun on May 1, using two four-row planters, and continued for three days without interruption. On May 4 a shower prevented further operation until May 7, when the work was again taken up and all was completed on May 10. All the plats were 160 rods long and consisted of forty-eight rows eighteen inches apart, with the exception of Plats 27 and 28 which, owing to lack of seed, consisted of thirty-one rows and two rows respectively.

A fairly uniform stand was secured on all plats except Nos. 26 and 27

which were rather thin. Plat 28 was exceptionally thick and vigorous, due apparently to the quality of the seed. This seed was of the same stock as No. 24, but subjected to a special form of treatment and styled by the producers "peeled and disinfected." The process of treatment, so far as could be learned, consisted of rubbing off the outer hull or husk and subsequent treatment of the seed with a weak solution of sulphuric acid. All through the season this plat was noticeably more vigorous than any other and remained practically free from "leaf spot," while all other plats were slightly affected.

Care was taken to give all plats the same treatment throughout the season. The operations of cultivation, thinning and hand-hoeing were conducted in such a way that there never was more than a week between the first and last plats. This work was in all cases begun on that side of the field that had been planted first so that all parts were cultivated during practically the same stage of development.

The yields as given in the table below represent topped beets and are computed from the factory tared weights. The weights are calculated in each case from the total yield of the plat. Plats 1 to 26 were 4.36 acres in extent, while Plats 27 and 28 contained 2.82 acres and .18 acre respectively. The sugar content and purity of the juice are averages of twelve tests in each case for Nos. 1 to 27, and three tests for No. 28.

TABLE I.—*Results of variety tests.*

Variety	Yield per acre	Sugar in juice	Purity of juice
	Tons	Per cent	Per cent
1. Schreiber. ....	8.90	12.4	80.3
2. Hoerning. ....	8.75	11.7	78.6
3. Knauer's Mangold . . . . .	9.74	11.9	78.5
4. Sachs. ....	8.88	11.7	78.2
5. Licht . . . . .	8.75	12.1	79.2
6. Ziemann . . . . .	9.37	12.3	78.2
7. Baumeier. ....	9.40	12.4	77.9
8. Friedrichswerther Elite. ....	9.07	12.4	76.3
9. Maurus Deutsch. ....	10.57	10.8	78.1
10. Vilmorin . . . . .	10.80	11.3	77.5
11. Dieckmann. ....	11.57	11.0	78.3
12. Simon Legrande. ....	11.84	10.5	77.5
13. Count Stadnicky . . . . .	11.42	11.7	78.8
14. Eloir. ....	12.54	10.4	77.0
15. Ames No. 1 (native) . . . . .	10.17	12.7	79.4
16. Ames No. 2 (native) . . . . .	10.78	12.0	80.0
17. Ames No. 3 (native) . . . . .	10.15	11.9	80.5
18. Bennecke. ....	11.46	11.4	76.6
19. Maximal Elite. ....	9.55	10.9	78.1
20. Original K. W. ....	10.04	11.9	81.5
21. Pioneer K. W. ....	9.95	11.5	79.4
22. Old Type K. W. ....	10.28	11.6	81.1
23. Dippe's K. W. ....	10.14	11.8	80.1
24. Aderstedt . . . . .	10.49	10.7	79.2
25. Dippe's Z. R. ....	9.00	11.1	78.7
26. Vilmorin (old seed) . . . . .	8.28	11.1	78.5
27. Utah grown seed . . . . .	8.38	10.7	76.9
28. Aderstedt "peeled". . . . .	12.00	11.7	81.6

## DESCRIPTION OF THE MAIN EXPERIMENT FIELD.

The main experiment field consisted of about forty-eight acres and included the fertilizer tests, time of planting, and methods of cultivation experiments.

The soil may be described as a deep medium loam, in excellent condition, almost perfectly level and quite-uniform in every respect, giving ideal conditions for the use of large plats. The field had been in corn during 1900 and 1901 and was prepared for the sugar beet crop by deep plowing in the fall of 1901. Early in March of 1902 it was carefully disked to preserve moisture. All through the spring the conditions were such that a good seed-bed might be prepared at any moment.

In all cases the ground was prepared for planting by thorough "double-disking," harrowing and rolling. A light harrow was attached behind the roller to slightly roughen the surface, and the planter immediately followed. The ordinary four-row, two-horse planter was used. All plats were planted in rows eighteen inches apart, using about twenty pounds of seed per acre. Later the plants were thinned to eight inches apart in the rows.

## EXPERIMENTS WITH FERTILIZERS.

As several years' experiments had shown that there was practically no use in applying commercial fertilizers to sugar beets upon the land at Ames, the regular test was discontinued. It was, however, thought desirable to get some further data upon the effect of extra heavy applications of farmyard manure, particularly upon the quality of the beets and their susceptibility to disease if such should appear. With similar objects in view, lime and salt were also used. This experiment, therefore, consisted of four plats: one receiving farmyard manure, one lime and one salt, with one unfertilized plat for comparison.

Shortly before planting, four plats consisting of one acre each were laid off. To the first, 600 pounds of common salt was applied; to the second, twenty tons of well-rotted farmyard manure; to the third, ten tons of refuse lime from the sugar factory; while the fourth plat was left unfertilized. All applied materials were simply disked into the ground.

All plats were planted on May 7, and a fairly uniform stand of beets was secured. All plats were carefully tended, and all received the same treatment throughout the season and always on the same day.

In the table below the tonnage represents the total yield of tared beets on each plat. The sugar and purity were calculated from lists of samples taken in the ordinary way out of every third load as delivered at the factory. All plats were harvested on November 10.

TABLE II.—*Results of fertilizer experiments.*

Fertilizer	Yield per acre	Sugar in juice	Purity of juice
	Tons	Per cent	Per cent
Salt, 600 pounds per acre .....	9.50	12.9	80.0
Farm manure, 20 tons per acre .....	9.53	11.5	79.3
Refuse lime, 10 tons per acre.....	9.64	11.4	80.0
Unfertilized .....	9.90	11.6	78.8

An examination of the above table will show that the different treatments had little effect upon the yields, the result being in favor of the unfertilized plat. As was experienced in previous years the manure and lime showed no appreciable effect in any way, and so far as these experiments go it would seem that heavy applications of farm manure may not always have a deleterious effect upon the sugar content or purity of the juice.

The salt, however, shows a decided effect upon the sugar content, giving 1.4 per cent more than the average of the other plats. But this effect of salt was not observed in another experiment conducted for the purpose of determining its effect upon beet diseases. Examinations throughout the season showed no differences except in the case of the salt, where the surface of the ground presented a decidedly alkaline appearance and formed a very much harder crust after rains.

On August 14 an examination was made as to the effects of different

treatments upon "leaf spot" but no differences could be seen. All plats were diseased to the extent of about 75 per cent. A small amount of root-rot was observed on all plats.

#### TIME OF PLANTING EXPERIMENT.

The object of this experiment was to determine the effect of early and late planting upon yield, quality and susceptibility to disease.

It had been observed in the general field crops of previous years that the early planted beets generally gave heavier yields but were almost invariably more injured by disease than were the later planted fields. In order to get more accurate data upon this question it was determined to make a thorough test under the same soil conditions. With this object in view, five three-acre strips on the described experiment field were laid off and planted at intervals of three weeks. The first plat was planted on March 26, the second on April 16, the third on May 7, the fourth on May 28 and the fifth on June 23. In each case the ground was in ideal condition for planting and the stands secured were all that could be desired. It may be observed that while the planting of March 26 was considered very early, some beets which were planted on March 14 gave excellent results. Throughout this experiment the various operations of cultivation, thinning and hoeing were performed at approximately the same stage of growth. The season was a particularly favorable one for work of this kind and no difficulty was experienced, except in the case of the last planting, which came up under rather unfavorable conditions, but a fair stand was eventually secured.

Owing to cool weather, the first planting took almost three weeks to come up and the second planting was ready for thinning at the same time. The plantings of May 28 and June 23 were very slow in developing although they came up quickly. On July 4 it was observed that the planting of May 28 was considerably more than three weeks behind the planting of May 7 in point of development.

All plats were treated as the ordinary field crop and were harvested on November 10. Owing to a mistake the total yield of the first planting was not secured and the tonnage given in the table below was estimated from a small area. In all other cases the tonnage was calculated from the total yield of the plat. The sugar tests were made as described in the fertilizer experiment.

TABLE III.—*Results of time of planting experiment.*

Date of Planting	Yield per acre	Sugar in juice	Purity of juice
	Tons	Per cent	Per cent
March 26. ....	*14.84	11.6	78.8
April 16. ....	13.64	11.5	79.1
May 7. ....	10.92	11.6	78.7
May 28. ....	8.88	11.6	78.8
June 23. ....	5.96	12.9	80.1

\*Estimated.

It will be seen that the results of this experiment were very decidedly in favor of early planting. The differences in yields were very marked and there seemed to be no ground for attributing the results to any other cause than the time at which the beets were planted. In view of the fact that the sugar beet is naturally very hardy and well adapted to early planting, the above results may well be worthy of consideration in determining the best time to plant in an ordinary season. Such early planting had not generally been practiced in the locality, and the first week in May was considered a good time to plant the bulk of the crop. In most cases it will be an advantage to practice at least some early planting so as to distribute the work of tending the crop.

The considerably higher sugar content of the last planting may be attributed to the very small average size of the beets and the almost entire absence of "leaf spot." On the first planting, traces of "leaf spot" were observed as early as July 4. On August 14 the first three plantings showed about 75 per cent of "leaf spot," while the planting of May 28 began to show traces and that of June 23 was entirely free and practically remained so to the end of the season.

#### METHODS OF CULTIVATION.

This experiment was designed to determine the effects upon the beet crop of various methods of treatment throughout the growing season. The different methods of treatment were as follows:

Plat 1. Three-inch cultivation throughout the season,—three acres.

Plat 2. Six-inch cultivation throughout the season,—three acres.

Plat 3. Ordinary cultivation, consisting of a gradual deepening of the horse-cultivation to four or five inches at the end of the season,—three acres.

Plat 4. Ordinary cultivation without hand-hoeing,—two and two-thirds acres.

Plat 5. Ordinary cultivation without hand-hoeing or weeding after thinning,—one-third of an acre.

Plat 6. Ordinary cultivation with a deep and thorough hand-hoeing when the beets reached a height of four to five inches,—three acres.

Plat 7. Six-inch cultivation at the beginning of the season, gradually decreasing in depth to three inches at the end of the season,—three acres.

Plat 8. Three-inch cultivation at the beginning of the season, gradually increasing in depth to six inches at the end of the season,—three acres.

Plat 9. Ordinary cultivation continued late into the season,—one acre.

Plat 10. Ordinary cultivation followed by stripping off half the leaves at the time of "laying by,"—one-third of an acre.

Plat 11. Ordinary cultivation, same as Plat 3,—three acres.

All plats, except 4, 5 and 6, received the ordinary shallow hand-hoeing shortly after thinning.

The ground used was a part of the described experiment field. All plats were planted in the ordinary way on May 2, and an exceptionally uniform stand was secured. No difficulty was experienced in applying to each plat treatment designed for it.

The first cultivation was, in all cases, shallow. For the deep cultivation a broad "goose-foot" shovel made by the farm blacksmith worked excellently. All of the plats, except that designed for late cultivation, were "laid by" about ten days earlier than usual, owing to a wet period during which cultivation could not be practiced. But each plat had received five horse-cultivations. The plat designed to go without hand-weeding grew very rank and was gone over with a scythe late in July to cut off the tops of the weeds to prevent seeding. The plat designed for late cultivation received two extra horse-cultivations, one about three weeks after the other plats had been "laid by," and another five weeks later, on September 3. The plat designated "bruised" in the table below was stripped of half of its leaves when they had reached their full size, on July 8. The work was done by hand, breaking off the outer half of the leaves.

On August 14 all plats were carefully examined for "leaf spot" and it was found that all were affected with the disease to the extent of about 50 per cent, except the plat from which half the leaves had been stripped, which showed only about 30 per cent of disease.

In the table below, the tonnage represents the average yield of the whole plat in each case, as determined by the factory tarred weights. The sugar content was determined by testing a sample from every third load of beets and making an average of the results. All plats were harvested on November 10.

TABLE IV.—*Results of methods of cultivation experiment.*

Treatment	Yield per acre	Sugar in juice	Purity of juice
	Tons	Per cent	Per cent
1. 3-inch cultivation throughout.....	13.50	12.2	79.2
2. 6-inch cultivation throughout.....	15.14	11.7	78.7
3. Ordinary cultivation.....	15.43	11.7	79.3
4. Ordinary cultivation without hand-hoeing ...	13.81	12.1	79.1
5. Ordinary cultivation without hand-hoeing or weeding.....	9.95	9.9	78.4
6. Ordinary cultivation with one deep (4-inch) hand-hoeing .....	17.60	11.8	77.3
7. 6-inch to 3-inch cultivation.....	16.62	12.4	79.2
8. 3-inch to 6-inch cultivation .....	16.90	12.9	79.5
9. Ordinary cultivation continued late into the season .....	19.04	10.7	78.2
10. Bruised, ordinary cultivation.....	17.90	11.4	78.9
11. Ordinary cultivation.....	15.21	11.4	78.9

A comparison of the results of some of the different methods of treatment shows how very easily the development of the sugar beet may be effected. It will be seen that deep cultivation seemed preferable to shallow cultivation so far as yield is concerned, while the shallow cultivation had the advantage of a somewhat higher sugar content, but this may be accounted for by the smaller average size of the beets. As regards the practice of hand-hoeing, it will be seen that the deep hoeing increased the yield over

two tons per acre above that secured from the ordinary hoeing and almost four tons per acre above that secured without hand-hoeing, although the latter yielded a somewhat higher sugar content owing, probably, to the considerably smaller average size of the beets. The results on the weedy, unhoed plat clearly show the harm that may result from careless treatment. Both sugar content and tonnage were seriously effected. The result of gradually deepening the cultivation was somewhat better than that secured from the reverse practice. The plat which received the late cultivation showed a very decided gain in tonnage, yielding nearly four tons more per acre than the plats receiving the ordinary treatment. The lower sugar content may be accounted for by considerably larger average size of the beets. If the greater yield was due to the two extra cultivations, as seemed to be the case, it shows that the practice may greatly increase the profits. The cost of each such cultivation need not exceed forty cents per acre, and the increase in yield would need to be but slight to make the extra labor a paying investment.

As regards the practice of breaking off the outer leaves, it would seem that good may result, since the yield secured was over two and a half tons more per acre than the average of the ordinarily treated plats. It has been argued that breaking off leaves or otherwise bruising the beet may result in permanent injury, but it was observed in this case that aside from the larger growth of roots the leaves were considerably healthier later in the season, being less effected by "leaf spot" than were the plats on either side. It is well known that the older leaves are always first attacked by "leaf spot," and it may be that removing them has the effect of deferring the appearance of the disease. While breaking off the leaves, as was practiced in this case, would hardly be practicable in general field practice, the result of the experiment indicates that the objection most strongly urged against cultivation after the spaces between the rows have been closed in by leaves may not be well founded. The result of the experiment in late cultivation also contradicts the general supposition. The limited experiment in 1901, recorded in Bulletin 73 of this Station, also indicates that leaf pruning and late cultivation may be profitable. It may be suggested that leaf pruning may be most beneficial in dry seasons when the partly developed roots are unable to gather sufficient moisture to properly support a large leaf growth which was made while there was an abundance of moisture.

#### EXPERIMENTS IN SUGAR BEET SEED PRODUCTION.

The work in sugar beet seed production was a continuation of what had been done in former years and partly recorded in earlier bulletins. The beets which had been tested and saved for mothers in the fall of 1901 were divided into two lots and planted in the spring of 1902. Lot 1 consisted of 1,153 beets testing above 16 per cent of sugar, and Lot 2 of 2,773 beets testing between 14 and 16 per cent. The two lots were planted far enough apart so that no intermingling of pollen between high and low beets could take place. The seed was harvested on July 29. About 150 pounds of



well-selected seed from Lot 1 was saved for further propagation. From Lot 2 about 300 pounds of seed was saved to be used for the factory crop.

From the best of the seed produced in 1901 a five-acre plat was planted to provide mothers for a commercial seed crop in 1903. The plat was planted in rows eighteen inches apart and the plants thinned to four inches apart in the rows. From this plat several thousand beets were selected upon the basis of their physical appearance and siloed for use for a commercial seed crop in 1903.

The regular chemical mother beet test was conducted during the last week of October, 1902. Before beginning this test it had been decided to breed from single individuals so far as possible, and, by keeping the progeny of each separate and selecting only from those individuals which showed themselves superior in quality and prepotency, to effect a more rapid improvement in sugar content and general adaptability. With this object in view all beets testing over 15 per cent of sugar were kept separate, and each individual was provided with a tag recording its sugar content. These tags were rolled up and placed in the holes made by the rasp in securing a sample of pulp for testing. About 200 beets thus selected and separately labeled were placed in the silo for use in 1903.

In this mother beet test, the new method worked out by R. S. Hiltner and R. W. Thatcher, referred to in Bulletin 73, was used and on the whole gave excellent satisfaction.

#### SUMMARY AND CONCLUSIONS.

In a test of twenty-odd varieties of sugar beets, the results from home-grown seed compared very favorably with those from the imported seed, which showed quite wide variations. The difference in this, as well as in former tests, seems to indicate that the quality of the seed is more important than the variety.

An application of farmyard manure of twenty-two tons per acre seemed to have no effect upon the quality of the sugar beets, nor upon the yield per acre, but in the latter respect this year's results differ from those of previous years.

The use of salt as a fertilizer, if it had any effect, improved the quality of the beets produced but had no effect upon the susceptibility to disease.

A comparison of early and late planting of sugar beets was decidedly in favor of early planting.

A comparison of different depths of horse-cultivation of sugar beets was in favor of rather deep cultivation. It should be remembered, however, that the season of 1902 was much wetter and cooler than normal. Experiments in previous years favored cultivation about three inches deep.

The yield of sugar beets was very considerably increased by deep hand-hoeing when the beets were four to five inches high.

The presence of weeds in sugar beet fields very materially decreased the yield and sugar content of the beets.

Breaking off a part of the leaves of sugar beets at "laying by" time did

not injuriously effect the yield or quality of the crop. Beets treated in this way were less effected by "leaf spot" disease than those not so treated.

Continuing the cultivation of sugar beets after the leaves were full grown considerably increased the yield per acre.

#### ACKNOWLEDGMENT.

Our thanks are due Mr. R. M. Allen and the Standard Cattle Company for the very liberal appropriations of land and labor for the experiments recorded in this bulletin, and to Dr. Samuel Avery and the Agricultural Chemical Department for assistance in conducting the mother beet test.

### CO-OPERATIVE VARIETY TESTS OF CORN IN 1902 AND 1903.

BY PROF T. L. LYON, NEBRASKA EXPERIMENT STATION.

Co-operative variety tests were undertaken because of a lack of definite knowledge regarding the types of corn best adapted to different sections or localities in the State. A variety test of corn at the Experiment Station is of only limited value to persons wishing to know what type of corn to grow in localities remote from the station. The more widely these tests are made the more accurate is our knowledge concerning the value of the different varieties.

It is equally important to the grower of pure bred seed corn and to the grower of corn for feeding or for market that he raise the type of corn best suited to his locality.

#### DIVISION OF THE STATE INTO SECTIONS.

The botanical survey of the State has shown that certain regions possess a collection of plants differing markedly from those in other regions, indicating a difference in the conditions governing plant growth in the respective sections. Although some of the same plants are found in all sections, the proportion differs greatly.

For these experiments the State has divided into six sections, the boundary lines of which correspond more or less closely with those marking changes in the natural vegetation. All variety tests in any one section included the same varieties. Nineteen varieties in all were tested but the maximum number in any one section was twelve. The larger varieties were used in the eastern sections and the late maturing varieties in the southeast, earlier maturing varieties were used in the north and west, and eared varieties in the west. The following table gives the name of each variety, the locality in which the seed was raised, and the section or sections in which tested:

*Years of test, origin, and location of test of each variety.*

Years tested	Name of variety	Seed raised	Section in which raised
1902-1903	Boone County White.....	Central Illinois.....	1.
1902-1903	Reid's Yellow Dent.....	Central Illinois.....	1, 2.
1902-1903	Silver Mine.....	Central Illinois.....	1, 2.
1902-1903	Riley's Favorite.....	Central Indiana.....	1, 2.
1902-1903	Mammoth White Pearl....	Washington Co., Nebraska	1, 2.
1902-1903	Mammoth Golden Yellow..	Washington Co., Nebraska	1, 2.
1902-1903	Snowflake White.....	Southwestern Iowa.....	1, 2, 3, 4.
1902-1903	Early Yellow Rose.....	Southwestern Iowa.....	1, 2, 3, 4.
1902-1903	Nebraska White Prize....	Washington Co., Nebraska	1, 2, 3, 4.
1902-1903	Golden Row.....	Washington Co., Nebraska	1, 2, 3.
1902-1903	Leaming.....	Central Illinois.....	1, 2, 3.
1902-1903	Hogue's Yellow Dent.....	Saline Co., Nebraska.....	1, 2, 3, 4, 5, 6.
1902-1903	Pride of the North.....	Minnesota.....	4, 5, 6.
1902-1903	Calico.....	Washington Co., Nebraska	3, 4, 5, 6.
1902.....	Minnesota No. 73.....	Minnesota.....	4, 5, 6.
1902-1903	Early Cattle King.....	Washington Co., Nebraska	5, 6.
1902-1903	Golden Cap.....	Dodge Co., Nebraska.....	1, 2, 3.
1902-1903	Legal Tender.....	Washington Co., Nebraska	2, 3.
1902-1903	Iowa Gold Mine.....	Washington Co., Nebraska	2, 3, 4.

Each section comprises certain counties as follows:

Section 1. Richardson, Pawnee, Nemaha, Johnson, Otoe, Cass.

Section 2. Sarpy, Douglas, Washington, Dodge, Burt, Cumming, Thurston, Dakota.

Section 3. Gage, Lancaster, Saunders, Jefferson, Saline, Seward, Butler, Thayer, Fillmore, York, Polk, Nuckolls, Clay, Hamilton, Merrick.

Section 4. Colfax, Stanton, Wayne, Dixon, Cedar, Knox, Platte, Madison, Pierce, Antelope, Boone, Nance.

Section 5. Webster, Adams, Hall, and all counties west except Lincoln and Perkins.

Section 6. Howard, Greeley, Wheeler, Holt, Boyd, and all counties west.

This can best be seen on the accompanying map of the State, on which the section boundaries are marked with heavy lines.



was much cool weather throughout all the corn growing months, followed by killing frost in the fall fully three weeks earlier than usual. Except in the southeastern portion of the State, a larger proportion of the ordinary field corn was not fully matured at the time the killing frost occurred. It is rather to be expected therefore that the late maturing varieties in these experiments should be at a disadvantage in the tests here recorded.

The season of 1903 also was unusually cool and wet, but except in the western portion of the State a killing frost did not occur so early. In spite of the delayed frost, corn did not mature so well as in 1902 owing to the great rainfall and attendant floods in the early part of the summer, which delayed planting, and also to the cold, damp fall weather.

#### GERMINATION TESTS OF SEED USED.

A germination test was made of the seed of each variety before it was sent out to the experimenters. The sample for the test was obtained by taking kernels from one hundred ears of each variety. The results were as follows:

#### *Germination test of each variety.*

Variety	Per cent of kernel germinating	
	1902	1903
Boone County White.....	86	98
Reid's Yellow Dent.....	80	98
Silver Mine.....	89	95
Riley's Favorite.....	95	98
Mammoth White Pearl.....	95	95
Mammoth Golden Yellow.....	99	98
Snowflake White.....	100	97
Early Yellow Rose.....	98	95
Nebraska White Prize.....	99	99
Golden Row.....	98	93
Leaming.....	94	100
Hogues' Yellow Dent.....	95	99
Pride of the North.....	96	63
Calico.....	98	94
Minnesota No. 13.....	86	.....
Early Cattle King.....	98	93
Golden Cap.....	98	94
Legal Tender.....	88	96
Iowa Gold Mine.....	99	93

The yield reported by each experimenter is herewith given, the tests being classified by sections, and stated for 1902 and 1903 separately.

SECTION 1.—*Tests in 1902.*

Name of Experimenter.	Postoffice.	
(1) William Ernst.....	Graf.	
(2) H. R. Coles.....	Pawnee City.	
	Yield in bu per acre	
	(1)	(2)
Reid's Yellow Dent.....	77	33
Leaming.....	68	34
Boone County White.....	78	27
Silver Mine.....	56	21
Riley's Favorite.....	50	20
Mammoth Golden Yellow.....	76	37
Nebraska White Prize.....	78	24
Mammoth White Pearl.....	58	25
Golden Cap.....	78	35
Snowflake White.....	72	30
Early Yellow Rose.....	79	32
Hogue's Yellow Dent.....	72	35

SECTION 1.—*Tests in 1903.*

Name of Experimenter.	Postoffice.
(1) William Ernst.....	Graf.
(2) C. F. Chase.....	Pawnee City.
(3) F. B. Liphardt.....	Graf.
(4) J. B. Cleghorn.....	Manley
(5) Ben Maiben.....	Palmyra.

	Yield in bushels per acre				
	(1)	(2)	(3)	(4)	(5)
Reid's Yellow Dent.....	75	72.4	54	45	31
Leaming.....	70.3	48.7	51.2	35	29
Boone County White.....	66.5	33.3	51.2	40	35
Silver Mine.....	68	53.6	46.6	38	32
Riley's Favorite.....	52	58.2	59.6	35	20
Mammoth Golden Yellow.....	64.6	48.3	58.6	38	28
Nebraska White Prize.....	76.5	59	50	35	33
Mammoth White Pearl.....	62	62.1	57.8	38	33
Golden Cap.....	60	43.7	61.7	38	25
Snowflake White.....	54	66.7	52.5	38	34
Early Yellow Rose.....	69.5	53.7	51.2	40	30
Hogue's Yellow Dent.....	60	65.9	61.7	35	35
Native Variety.....		68.2		{ 40 45	

SECTION 2.—*Tests in 1902.*

Name of experimenter.	Postoffice.
(1) D. F. Stouffer.....	Bellevue.
(2) Joseph Hall.....	Tekamah.
(3) Lee Smith.....	De Soto.
(4) Fred Echtenkamp.....	Arlington.
(5) Charles Thompson.....	West Point.

	Yield in bushels per acre				
	(1)	(2)	(3)	(4)	(5)
Reid's Yellow Dent.....	23	64	48	42	25
Leaming.....	17	67	54.5	44	48
Legal Tender.....	25	72	58	.....	28
Silver Mine.....	21	59	49	45	37
Iowa Gold Mine.....	23	66	47.5	.....	.....
Mammoth Golden Yellow.....	26	57	.....	39	38
Nebraska White Prize.....	20	63	.....	36	32
Mammoth White Pearl.....	20	67	.....	38	40
Golden Cap.....	24	77	50	47	.....
Snowflake White.....	17	75	60	44	41
Early Yellow Rose.....	23	64	45	32	.....
Hogue's Yellow Dent.....	21	71	64	43	40

SECTION 2.—*Tests in 1903.*

Name of experimenter.	Postoffice.
(1) Fred Echtenkamp.....	Arlington.
(2) W. H. Hoegemeyer.....	Hoopar.
(3) C. Y. Thompson.....	West Point
(4) Stouffer Bros.....	Bellevue.
(5) Joseph Hall.....	Tekamah.

	Yield in Bushels per acre				
	(1)	(2)	(3)	(4)	(5)
Reid's Yellow Dent.....	39	49.4	48	75	90.5
Leaming.....	36	51.9	60	70	76
Legal Tender.....	.....	44.4	45	72	72
Silver Mine.....	34	48.5	48	61	80.6
Iowa Gold Mine.....	.....	44.2	42	67	76
Mammoth Golden Yellow.....	39	46.4	63	70	85
Nebraska White Prize.....	36	47.1	51	65	65
Mammoth White Pearl.....	41	44.6	45	72	76
Golden Cap.....	33	55.4	60	79	94
Snowflake White.....	34	44.9	48	72	92.6
Early Yellow Rose.....	33	43.6	36	65	55.5
Hogue's Yellow Dent.....	34	48.3	45	78	72
Native Variety.....	.....	52.2	.....	.....	.....

SECTION 3.—*Tests in 1902.*

Name of experimenter.	Postoffice.
(1) D. E. Richey .....	Rising City.
(2) Anton Kuska .....	Milligan.
(3) L. A. Love .....	Valparaiso.
(4) C. G. Nootz .....	Raymond.
(5) Experiment Station .....	Lincoln.
(6) J. C. Doubt .....	Bethany.
(7) E. B. Stauber .....	Stoddard.

	Yield in bushels per acre						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hogue's Yellow Dent. ....	52.5	61	58.4	20	75.4	70	40
Golden Row. ....	60	76	52.1	22	63.6	58	20
Nebraska White Prize .....	55	55	48.9	20	62.7	54	36
Golden Cap. ....	60	70	49.9	16	65.7	72	30
Leaming. ....	57.5	61	49.8	22	59.6	67.5	34
Early Yellow Rose. ....	57	70	49.8	20	65.4	45	36
Calico .....	55	70	50.1	42	60	72	32
Legal Tender. ....	53	61	50.8	17.	65	58	36
Iowa Gold Mine. ....	57.5	70	.....	16	57.9	45	35
Snowflake White. ....	50	58	45.7	20	58.9	54	36



SECTION 3.—*Tests in 1903.*

Name of experimenter.	Postoffice.
(1) S. R. Hall.....	Havelock.
(2) R. Hogue.....	Crete.
(3) Raleigh Wilder.....	Central City.
(4) Experiment Station.....	Lincoln.
(5) A. A. Galt.....	Edgar.
(6) S. L. Johnson.....	Edholm.
(7) J. Miner.....	Friend.
(8) John D. Hasik.....	Abie.
(9) L. A. Love.....	Valparaiso.
(10) J. H. Huyck.....	Liberty.
(11) D. E. Ritchey.....	Rising City.
(12) J. M. Woods.....	Ulysses.
(13) D. J. Wood.....	Fairbury.
(14) Charles B. Camp.....	Cheney.

	Yield in bushels per acre.													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Hogue's Yel. Dent.	57	....	30	75.1	39.5	45	20	62	57.3	42	60	40	40	57
Golden Row.....	57	43	20	69.1	34	50	22	53	32.1	30	57	30	28.5	55
Neb. White Prize.....	56	52	20	59.9	34.5	50	....	36	30.5	41.5	54	30	25	63
Golden Cap.....	63	43	35	66.7	37.5	50	22	50	34	31	51	35	26	60
Leaming.....	47	41	33.5	61.6	29	40	20	43	31.8	29	57	....	27.5	50
Early Yellow Rose.	58	42	25	62.1	30	42	17	46	30	30	54	30	18	53
Calico.....	51	46	30	59.8	34	54	....	38	29.7	40	56	37	27.5	62
Legal Tender.....	56	28	22.5	68.1	34	52	19	56	43.8	30	51	....	25	54
Iowa Gold Mine....	58	30	20	61.1	32	45	19	40	33.7	28	58	35	17.5	56
Snowflake White....	53	44	25	70	33	....	19	37	30.1	44	57	33	30	63
Native Variety....	....	....	30	..	{ 36 42	60	....	59	....	40	....	....	....	63

SECTION 4.—*Tests in 1902.*

Name of experimenter.	Postoffice.
(1) F. J. Houtz.....	Albion.
(2) L. M. Heesacker.....	Lindsay.
(3) D. M. Decamp.....	Clearwater.

	Yield in bushels per acre		
	(1)	(2)	(3)
Hogue's Yellow Dent.	35	56	Not matured
Golden Row.....	50	54	Not matured.
Nebraska White Prize	40	53	Not matured.
Minnesota No. 13 .....	27	33	20
Iowa Gold Mine.....	40	49	Not matured.
Pride of the North .....	25	37	20
Snowflake White.....	45	54	Not matured.
Early Yellow Rose.....	35	44	Not matured.
Calico.....	48	44	Not matured.
Early Cattle King.....	32	34	Not matured.

SECTION 5.—*Tests in 1902.*

Name of experimenter.	Postoffice.
(1) I. D. Evans .....	Kenesaw.
(2) G. A. Prime. ....	Arapahoe.
(3) A. C. Bischel .....	Kearney.
(4) W. H. Gasaway .....	Bertrand.
(5) J. H. McLaughlin .....	Doniphan.
(6) S. C. Bassett .....	Gibbon.
(7) J. S. Cobeldick .....	Alma.

	Yield in bushels per acre						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Early Cattle King .....	Not matured	8	Not matured	37	27.5	32	60
Hogue's Yellow Dent. . .	Not matured	18.5	Not matured	39	31	42	60
Minnesota No. 13 .....	Matured	7	25	33	18	31	50
Calico .....	Not matured	14	Not matured	37	28	40	50
Pride of the North .....	Matured	7.5	30	33	18	30	60
Nebr. White Prize .....	Not matured	7	Not matured	34	23.5	36	40
Early Yellow Rose .....	Not matured	16	Not matured	36	28	30	60
Golden Row. ....	Not matured	17	Not matured	38	26	36	60

SECTION 5.—*Tests in 1903:*

Name of experimenter.	Postoffice.
(1) G. A. Prime. ....	Arapahoe.
(2) I. D. Evans. ....	Kenesaw.

	Yield in bu. per acre	
	(1)	(2)
Early Cattle King. ....	30	20
Hogue's Yellow Dent. . .	36	25
Calico .....	35	30
Pride of the North .....	24	20
Nebraska White Prize .....	34.5	30
Early Yellow Rose .....	30	22
Golden Row. ....	34	22
Native variety. ....		

SECTION 6.—*Tests in 1902.*

Name of experimenter.	Postoffice.
(1) D. C. Conkel .....	Weissert.
(2) G. F. Smith .....	Ewing.
(3) L. V. Humphrey .....	Atkinson.
(4) T. W. DeLong .....	Ainsworth

	Yield in bushels per acre			
	(1)	(2)	(3)	(4)
Early Cattle King .....	Not matured	30	Not matured	Not matured
Minnesota No. 13 .....	30	25	Not matured	Not matured
Calico .....	Not matured	30	Not matured	Not matured
Pride of the North .....	35	30	Not matured	Not matured
Nebraska White Prize .....	Not matured	40	Not matured	Not matured
Early Yellow Rose .....	Not matured	30	Not matured	Not matured
Hogue's Yellow Dent .....	Not matured	45	Not matured	Not matured

All of the foregoing varieties were tested on the Experiment Station farm and gave the following yields:

*Variety tests on the Experiment Station farm.*

Variety	Source of Seed	Yield in bushels per acre		
		1902	1903	Av'ge
Hogue's Yellow Dent .....	Saline Co., Nebr. ....	75.4	75.1	75.2
Reid's Yellow Dent .....	Illinois .....	68.9	72.2	70.5
Legal Tender .....	Washington Co., Nebr. ....	65.0	68.1	66.5
Golden Row .....	Washington Co., Nebr. ....	63.6	69.1	66.3
Golden Cap .....	Dodge Co., Nebr. ....	65.7	66.7	66.2
Snowflake White .....	Iowa .....	58.9	68.7	63.8
Early Yellow Rose .....	Iowa .....	65.4	62.1	63.7
Nebraska White Prize .....	Washington Co., Nebr. ....	62.7	59.9	61.3
Leaming .....	Illinois .....	59.6	61.6	60.6
Mammoth Golden Yellow .....	Washington Co., Nebr. ....	54.3	65.7	60.0
Calico .....	Washington Co., Nebr. ....	60.0	59.8	59.9
Early Cattle King .....	Washington Co., Nebr. ....	56.8	62.5	59.6
Iowa Gold Mine .....	Washington Co., Nebr. ....	57.9	60.9	59.4
Boone County White .....	Illinois .....	58.2	59.8	59.0
Mammoth White Pearl .....	Washington Co., Nebr. ....	54.3	61.8	58.0
Silver Mine .....	Illinois .....	50.0	58.1	54.0
Riley's Favorite .....	Indiana .....	53.2	51.0	52.1
Pride of the North .....	Minnesota .....	52.5	31.4*	41.9
Minnesota No. 13 .....	Minnesota .....	43.5		

\*The poor yield of this variety in 1903 was due to the failure of the seed to germinate.

The following is an explanation of the characteristics of each variety, together with a brief history and statement of the source of the seed used in these experiments:

## HOGUE'S YELLOW DENT.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, slightly tapering; length of ear, 8 to 9 inches; circumference of ear, 7 to 8 inches; color of kernel, yellow; shape of kernel, wedge; indentation of kernel, rough; number of rows, 16 to 20; size of shank, medium; size of cob, medium; color of cob, red.

Seed of this variety was obtained from Mr. R. Hogue of Crete, Saline county, Nebraska, who has grown it since 1885. The corn was obtained originally from Mr. Shrader, who lived in the southern part of Lancaster county, Nebraska, and from whom Mr. Hogue purchased it in the year named. The history of the corn previous to that time is not known. Mr. Hogue has carefully selected the seed each year, having particularly in view the obtaining of a deep kernel. The result is an ear with deep kernels, deeply indented and fairly late maturing. One characteristic of the corn is a thick, medium tall stalk with long, broad leaves, giving a large amount of foliage. The variety has never been intentionally crossed since Mr. Hogue obtained it. It is a moderately late maturing variety.

## REID'S YELLOW DENT.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, slightly tapering; length of ear, 9 inches; circumference of ear, 7 inches; color of kernel, light yellow; shape of kernel, long wedge; indentation of kernel, medium smooth; number of rows, 16 to 18; size of shank, small; size of cob, medium; color of cob, red.

Seed of this variety was obtained from Mr. James L. Reid of East Lynn, Illinois, whose father, Robert Reid, originated the variety by selection from a cross of Gordon Hopkins' corn from Ohio and what was called "Little Yellow corn" that was raised in Central Illinois. The corn has not been intentionally crossed by Mr. Reid since 1847, and has been improved by selection since that date. It is a moderately early maturing variety.

## LEGAL TENDER.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, cylindrical; length of ear, 9 to 10 inches; circumference,  $7\frac{1}{2}$  to 8 inches; color of kernel, lemon yellow; shape of kernel, long wedge; indentation of kernel, rough; number of rows, 18 to 20; size of shank, small; size of cob, small; color of cob, red.

Seed of this variety was obtained from Mr. Fred Echtenkamp of Arlington, Washington county, Nebraska. It is moderately early maturing.

## GOLDEN ROW.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, cylindrical; length of ear, 9 to 10 inches; circumference,  $7\frac{1}{2}$  inches; color of kernel, deep yellow; shape of kernel, long wedge; indentation of kernel, rough; number of rows, 20; size of shank, medium; size of cob, medium; color of cob, red.

Seed of this variety was obtained from M. H. Smith & Son, De Soto, Washington county, Nebraska. It was brought from Northeastern Indiana by Mr. M. H. Smith in 1879, and had been carefully selected for three years previous to that time. Since 1876 it has not been intentionally crossed. The ear has increased in size, especially in length, since coming to Nebraska. It is a moderately late maturing variety.

#### GOLDEN CAP.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, slightly tapering; length of ear, 9 inches; circumference of ear, 6 to 6½ inches; color of kernel, deep yellow with light golden cap; shape of kernel, long wedge; indentation of kernel, medium; number of rows, 14 to 16; size of shank, very small; size of cob, very small; color of cob, deep red.

Seed of this variety was obtained from Mr. J. M. Maher of Fremont, Dodge county, Nebraska. He originated the variety in 1889 by crossing Mammoth Horsetooth with a corn from Kansas having a long, slim ear. The kernels of the Mammoth Horsetooth corn were very deep but far apart, while the Kansas corn had short kernels crowded close together. In selecting from this cross, ears showing as nearly as possible a medium between the characteristics of the two varieties were reserved for seed. The result was a variety having kernels closer together than the Mammoth Horsetooth corn and deeper than the Kansas variety. When Golden Cap was first established the kernel was light colored with a golden cap. In 1892 Mr Maher made a cross of the corn above described with a red variety which has given the kernel a reddish yellow color underneath the golden colored cap of the kernel. Again in 1898 another cross was made with a yellow variety of corn having a smooth, shallow kernel, the intention being to make the variety earlier. The process of crossing continued for two years. The result is a fairly deep grained and moderately early maturing variety of corn.

#### SNOWFLAKE WHITE.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, slightly tapering; length of ear, 8 to 9 inches; circumference of ear, 7 to 7½ inches; color of kernel, white; shape of kernel, medium wedge; indentation of ear, medium rough; number of rows, 16 to 22; size of shank, medium; size of cob, medium; color of cob, white.

Seed of this variety was obtained from J. B. Armstrong & Son, Shenandoah, Iowa. It is a late maturing variety.

#### EARLY YELLOW ROSE.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, slightly tapering; length of ear, 8 to 9 inches; circumference of ear, 7 to 7½ inches; color of kernel, yellow; shape of kernel, medium wedge; indentation of kernel, very rough; number of rows, 16 to 20; size of shank, medium; size of cob, medium; color of cob, red.

Seed of this variety was obtained from J. B. Armstrong & Son, Shenandoah, Iowa. It is a late maturing corn.

#### NEBRASKA WHITE PRIZE.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, cylindrical; length of ear, 9 inches; circumference of ear, 7 inches; color of kernel, white; shape of kernel, medium wedge; indentation of kernel, rough; number of rows, 16 to 18; size of shank, medium; size of cob, medium; color of cob, white.

Seed of this variety was obtained from M. H. Smith & Son, De Soto, Washington county, Nebraska. It was brought by Mr. Smith from North-eastern Indiana in 1879. It has been grown pure by Mr. Smith since 1874. The ear has increased in size since coming to Nebraska. It is a moderately late maturing variety.

#### LEAMING.

Standard for type adopted by the Nebraska Corn Improvers' Association is somewhat different from that adopted by the Illinois Association. As seed of this variety was obtained in Illinois the standard for that State is given. Shape of ear, tapering; length of ear, 10 inches; circumference of ear, 7 inches; color of kernel, deep yellow; indentation of kernel, rough; shape of kernel, medium wedge; number of rows, 16 to 24; size of shank, medium; size of cob, medium; color of cob, deep red.

Seed of this variety was obtained from Mr. E. E. Chester of Champaign, Illinois, who purchased the seed from Mr. J. S. Leaming of Wilmington, Ohio, in 1885. Mr. Leaming originated this variety, it is said, in 1826. He began selecting seed at this time from the ordinary yellow corn grown on the Little Miami bottoms. For five years he constantly selected his seed corn to conform to a definite type, and his son has been carrying on the selection of late years. The strain of this variety that has been used in this test has a rougher ear than that ordinarily raised in this State. It shows a tendency, however, to revert to the smooth type. It is a moderately early maturing variety.

#### MAMMOTH GOLDEN YELLOW.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, cylindrical; length of ear, 10 to 11 inches; circumference of ear, 7 to 8 inches; color of kernel, yellow; shape of kernel, medium wedge; indentation of kernel, rough; number of rows, 20 to 24; size of shank, large; size of cob, medium; color of cob, red.

Seed of this variety was obtained from M. H. Smith & Son. It originated in a cross between Golden Row and Hogue's Yellow Dent. The cross was made in 1889. It has never been intentionally crossed since that time but has been carefully selected for type. It is a late maturing variety.

#### CALICO.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, tapering; length of ear, 7 to 8 inches; circumference of ear,

6½ to 7½ inches; color of kernal, mixed; shape of kernel, medium wedge; indentation of kernel, slightly rough; number of rows, 16 to 20; size of shank, medium; size of cob, medium; color of cob, mixed.

Seed of this variety was obtained from Mr. James Sully, De Soto, Washington county, Nebraska. It has been grown by him since 1894, when he obtained the seed of John Martin of Neola, Iowa, as seed of Calico corn. He has grown it since that time without intentionally crossing with any variety and has carefully selected the seed each year. It is an early maturing variety of corn.

#### EARLY CATTLE KING.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, slightly tapering; length of ear, 8 to 9 inches; circumference of ear, 7 inches; color of kernel, reddish yellow; shape of kernel, broad wedge; indentation of kernel, slightly rough; number of rows, 14 to 16; size of shank, large; size of cob, small; color of cob, red.

Seed of this variety was obtained from M. H. Smith & Son. They obtained the seed from Illinois in 1900. The ear is small, but with a fairly deep grain. It is a moderately early maturing variety.

#### IOWA GOLD MINE.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear slightly tapering; length of ear, 8 inches; circumference of ear, 6½ to 7 inches; color of kernel, yellow; shape of kernel, wedge; indentation of kernel, rough; number of rows 16 to 20; size of shank, medium; size of cob, medium; color of cob, red.

Seed of this variety was obtained from Mr. Fred Echtenkamp of Arlington, Washington county, Nebraska. It is a wellknown variety of corn. It is a moderately early maturing corn.

#### BOONE COUNTY WHITE.

Standard for type accepted by the Nebraska Corn Improvers' Association. Shape of ear, cylindrical; length of ear, 10 inches; circumference of ear, 7½ inches; color of kernel, pearl white; shape of kernel, medium wedge; indentation of kernel, rough; number of rows, 16 to 22; size of shank, medium; size of cob, medium; color of cob, white.

Seed of this variety was obtained from Mr. A. P. Grout of Winchester, Illinois, who obtained the seed several years ago from the originator of the variety, Mr. James Riley of Thorntown, Indiana. Mr. Grout has been growing the corn for seed without any intentional crossing. Mr. Riley began selecting seed for this variety in 1876, starting with a large variety with tapering ear called White Mastodon. He has not crossed it with any other corn, but has brought about a radical improvement in the type by careful selection of seed. It is a late maturing variety.

#### MAMMOTH WHITE PEARL.

Standard for type adopted by the Nebraska Corn Improvers' Association.

Shape of ear, cylindrical; length of ear, 10 to 11 inches; circumference of ear, 8 to 8½ inches; color of kernel, white; shape of kernel, medium wedge; indentation of kernel, rough; number of rows, 18 to 24; size of shank, large; size of cob, large; color of cob, white.

Seed of this variety was obtained from M. H. Smith & Son. It originated in a cross between Nebraska White Prize and Mammoth White. The latter was a variety from Shawnee county, Kansas. It had a medium short, thick ear, with moderately deep grained kernels and was very late maturing. The cross was made in 1890, since which time it has been carefully selected for type, and no further cross has been intentionally made. It is a late maturing variety.

#### SILVER MINE.

Standard for type of this variety adopted by the Nebraska Association is not the same as that adopted by the Illinois Association. As the seed was obtained in Illinois, the latter is given. Shape of ears, cylindrical; length of ear, 9 inches; circumference of ear, 7 inches; color of kernel, cream white; indentation of kernel, very rough; shape of kernel, broad wedge; number of rows, 16 to 20; size of shank, small; size of cob, small; color of cob, white.

Seed of this variety was obtained from Mr. Warner of Sibley, Illinois, who obtained the seed from Mr. J. H. Beagley of Sibley, Illinois, who raised it from seed selected from a prize-winning exhibit of white corn at the Ford county (Illinois) Farmers' Institute in 1890. Its history before this date is not known but it has not been intentionally crossed since that time. It is a moderately early maturing variety.

#### RILEY'S FAVORITE.

Standard for type adopted by Nebraska Corn Improvers' Association. Shape of ear, slowly tapering; length of ear, 9 inches; circumference of ear, 7 inches; color of kernel, deep yellow; indentation of kernel, rough; shape of kernel, medium wedge; number of rows 16 to 20; size of shank, small; size of cob, small; color of cob, deep red.

Seed of this variety was obtained from Mr. Marley Riley of Thorntown, Indiana, whose father, James Riley, originated the variety in that locality in 1885. It is the result of a cross of a large late corn (Golden Yellow) with a small early corn (Pride of the North). It is a fairly early maturing variety.

#### PRIDE OF THE NORTH.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, cylindrical; length of ear, 7 inches; circumference of ear, 6 inches; color of kernel, orange yellow; shape of kernel, broad wedge; indentation of kernel, slightly rough; number of rows, 16; size of shank, small; size of cob, small; color of cob, red.

Seed of this variety was obtained from Northrup, King & Company of Minneapolis, Minnesota. It is a small eared, early maturing variety,



and is widely grown over the United States. Its characters differ greatly in different portions of the country.

#### MINNESOTA NO. 13.

Standard for type adopted by the Nebraska Corn Improvers' Association. Shape of ear, tapering; length of ear, 8 inches; circumference of ear, 7 inches; color of kernel, yellow; shape of kernel, oval cap with medium depth; indentation of kernel, smooth; number of rows, 14 to 18; size of shank, medium; size of cob, medium; color of cob, red.

Seed of this variety was obtained from Northrup, King & Company of Minneapolis, Minnesota. The variety was originated by the Minnesota Experiment Station, and is a small eared, early maturing corn.

#### SUMMARY.

Corn brought from outside of the State did not yield so well as corn from seed raised within the State. A notable exception to this is Reid's Yellow Dent.

Early maturing varieties did not yield so well as later maturing ones.

Yellow varieties gave, on the whole, better yields than white varieties.

The proportion of corn to cob did not bear any relation to the yield of corn per acre, neither did the size of the ear.

Some of the varieties of corn brought from other States, although not yielding remarkably well in these trials, give evidence of becoming very valuable varieties after they have been raised in this region for a sufficient number of years to become well adapted to the climate. Of these Reid's Yellow Dent, Boone County White, Leaming and Silver Mine are particularly promising.

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BY E. A. BURNETT AND H. R. SMITH, NEBRASKA EXPERIMENT STATION.

### THE RELATIVE VALUE OF ALFALFA, WHEAT SHORTS, AND SKIM-MILK TO SUPPLEMENT CORN FOR FATTENING PIGS.

The object of the experiment just performed at the Nebraska Experiment Station and described below was (1) to show that corn can be fed more economically in conjunction with foods rich in protein and mineral matter, and (2) to determine which of three common foods is the cheapest source of protein.

#### PLAN OF THE EXPERIMENT.

Twenty pigs, uniform in type, all in good condition, were placed in four lots, five pigs in each lot. They were put on their experimental rations long enough to become accustomed to the change before the initial weighings were made.

The average record of each pig is found in the following table:

	Average weight at the beginning of the experi- ment, Dec. 2, '02	Average weight at the close of the experiment, Feb. 24, 1903	Average gain during the 12 weeks	Average gain per day	Average amount of food con- sumed during the 12 weeks	Food consumed per pound of gain.
Lot I. ....	Lbs. 127.6	Lbs. 206.2	Lbs. 78.6	Lbs. .93	Lbs. .....	Lbs. 7.4
Corn meal .....					587	
Lot II. ....	129.2	261.8	132.6	1.57	.....	5.2
Corn meal. ....					585.4	
Milk solids (in 1170 pounds skim-milk). ....					110.5	
					695.9	
Lot III. ....	126	227.6	101.6	1.2	.....	5.8
Corn meal 80 per cent .....					473.9	
Shorts 20 per cent. ....					118.4	
					592.3	
Lot IV .....	128.4	230	101.6	1.2	.....	5.8
Corn meal 80 per cent. ....					474.8	
Alfalfa 20 per cent .....					118.7	
					593.5	

The alfalfa fed in this experiment was in the nature of chaff, consisting mostly of leaves which had fallen from the hay as it was thrown from the mow to the barn floor for cattle. For the purpose of making a true comparison of these leaves with the whole plant an analysis was made. The leaves were found to be 40 per cent richer in crude protein than the entire plant, 30 per cent higher in fat, 15 per cent higher in mineral matter, and 50 per cent lower in crude fiber, which substance is largely indigestible matter. This chaff was first mixed with the corn meal, then placed in the feed trough, where it was made into a thick slop with water. The other lots were fed in the same way, except that the feed for Lot 2 was mixed with skim-milk instead of water.

#### FINANCIAL STATEMENT.

With the alfalfa hay worth \$7 per ton, the leaves, containing 40 per cent more protein, would be worth approximately \$10 per ton. The shorts cost \$12.50 per ton delivered. The Dairy Department charged fifteen cents per hundred for the skim-milk used. Corn was delivered to the barns at thirty cents per bushel. Adding the usual rate of six cents per hundred for grinding, the corn meal cost \$12 per ton. At these prices, each hundred pounds of gain in the several lots cost as follows:

Lot 1. Corn alone.....	\$4.48
Lot 2. Corn and skim-milk.....	3.97
Lot 3. Corn and shorts. ....	3.53
Lot 4. Corn and alfalfa. ....	3.40

The skim-milk pigs were the most hearty feeders and made the heaviest gains, but it proved a more expensive source of protein at the prices quoted.

This experiment shows that at the market prices quoted and in the proportions used in the experiment, skim-milk will make corn bring four cents more per bushel, wheat shorts eight cents more, and alfalfa leaves nine cents more. Assuming that only 5 per cent of the 252,520,173 bushels of corn produced in Nebraska this year is being fed to hogs as a single food, these figures would go to show that over \$1,000,000 more wealth would be added to the state if wheat shorts or alfalfa were substituted for one-fifth of the corn fed.

#### THE SLAUGHTER TEST.

Since corn is deficient in protein and mineral matter, we should naturally expect that pigs when supplied more of these materials from other sources would have a greater proportion of lean meat, more blood and bone, better developed vital organs, and therefore greater bodily vigor.

After the pigs were finished for market, one was selected from the alfalfa lot to represent the pigs that were supplied more protein. A pig twelve pounds heavier was taken from the corn-fed lot. These were both slaughtered and cross-sections of the carcasses placed before the students of the School of Agriculture for examination. All were quick to identify the alfalfa-fed pig by the thicker streaks of lean and thinner layers of fat meat. Both the

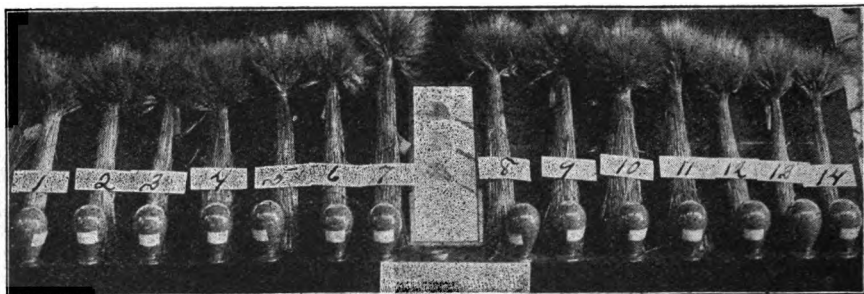
pigs dressed 83.7 per cent of their live weight. The internal organs weighed as follows:

	Corn pig	Corn and alfalfa pig
	Lbs.	Lbs.
Heart. ....	.7	.7
Lungs. ....	1.2	1.4
Liver. ....	3.4	3.9
Blood. ....	5.4	5.7
Intestinal fat. ....	5	5.7

This slaughter test shows that by supplying more protein, in this case by feeding alfalfa, we get a greater development of internal organs and more health and vigor. Undoubtedly, if more attention was given to supplying such foods as will bring about a healthy organism, losses from cholera and other diseases would be greatly reduced.

The strength of the thigh bones was tested by providing supports at both ends, applying pressure in the middle. This test was made in a machine for testing strength of materials. The bones of the corn-fed pig measured one-sixteenth of an inch larger in diameter. One bone from the corn-fed pig broke under a pressure of 320 pounds and the other 330 pounds. One of the bones of the corn and alfalfa-fed pigs broke at 500 pounds and the other at 520 pounds. From this test it is evident that breakdowns, which often occur in heavy corn-fed hogs, are the fault of the feed rather than the animal. It further shows that the ability of the hog to stand up well on legs is a matter of density of bone rather than size.

In another experiment varying quantities of alfalfa will be fed to determine the best proportion for making the most economical gains.



- |                        |                |                 |
|------------------------|----------------|-----------------|
| 1. Fretes.             | 6. Richi.      | 11. Velvet Don. |
| 2. Kahla.              | 7. Gharnovka.  | 12. Kahla.      |
| 3. Mohamed ben Bachir. | 8. Pererodka.  | 13. Mahmoudi.   |
| 4. Yellow Gharnovka.   | 9. Kubanka.    | 14. Adjini.     |
| 5. Pelissier.          | 10. Black Don. |                 |

### MACARONI WHEATS.

BY PROF. T. L. LYON, NEBRASKA EXPERIMENT STATION.

What part the so-called macaroni wheats are to take in the farm economy of this region is yet to be determined. It will depend largely upon their productiveness as compared with other crops, and upon their market or feeding values. Judged by the first of these considerations, as exhibited in the experiments here recorded, macaroni wheat would seem to be entitled to a place among the crops of at least a portion of Nebraska. The rather extensive distribution of this wheat made by the Bureau of Plant Industry of the U. S. Department of Agriculture through this Station in 1902 was planned by the writer to give information on the following points: (1) The productiveness of macaroni wheat as compared with other spring varieties or with winter wheat; (2) the portions of the state to which it is best adapted; (3) the varieties best suited to growth in this region. While it is not possible to draw final conclusions from a test during one season, it is considered that results of sufficient value have been obtained to warrant publication. Especially is this the case in view of the large number of inquiries from persons wishing to know whether it will be a profitable crop for them to raise, and who can best judge of this by knowing what success has already been attained by others in the same portions of the state. For this reason individual tests, accompanied by the conditions under which they were made, are reported.

While this bulletin is published for the purpose of making known the

results of experiments carried on with macaroni wheats in this state, it will be of interest to persons who may be considering the advisability of undertaking their culture to include a short description of the wheats, and of the industry to which they give rise, as well as some evidence looking towards the possible market for the crop.

#### APPEARANCE AND HABITS OF GROWTH OF MACARONI WHEATS.

The macaroni wheats are so called because they are largely used in the manufacture of macaroni and other edible pastes. These products are much used for food in Europe, and are constantly becoming more widely used in this country. The wheats belong to the group *Triticum durum*, while the common wheats, from which bread is made, belong to *Triticum vulgare*. The macaroni wheats are tall, with broad, smooth leaves. The heads are heavily bearded, being much more so than any of the ordinary wheats, and the plant when headed has much the appearance of barley. The heads are large and vary in color from light yellow to almost black, depending upon the variety. The kernels are large, very hard, having less starch than common wheat. They vary from light yellow to reddish yellow in color.

The habits of growth of durum wheats adapt them to regions of light rainfall. They have great ability to withstand drouth and heat, but require a rich soil, although they are notably tolerant of alkali.

In some mild climates durum wheats are sown in the fall, but generally they are grown as spring wheats, and they must occupy that place in Nebraska at present.

The principal durum wheat-growing countries are Russia, Turkestan, North Africa, the drier portions of Argentina, Chile, India and Asia Minor, and to some extent Spain, Italy, Greece, Roumania, Mexico and the Central American states.

#### FOREIGN MARKET FOR MACARONI WHEAT.

One of the most important considerations in the attempt to introduce durum wheat culture into this country is that of a market for the crop. What the foreign demand for edible pastes has become in the last few years may be appreciated by reading the following facts taken from a report by Mr. Robert P. Skinner, Consul General at Marseilles\*

"The European demand for macaroni wheat has increased with remarkable rapidity within recent years. The present consumption of macaroni wheat by the factories in Marseilles alone is 24,000 bushels daily. The output of macaroni and edible pastes in that city is limited only by the supply of wheat suitable for their manufacture. Throughout the entire Mediterranean country there has been a corresponding increase in the manufacture of these products. Semolino mills have been erected, or are in course of construction, in all the important wheat markets, and in the Levant. Perhaps the largest semolino mill in the world is one recently built at Salonica, which has a daily capacity of over 7,000 bushels of wheat.

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\*U. S. Dept. of Agr., Bureau of Plant Industry; Bull. No. 20.

"The supply of wheat for this large industry is not drawn from western or northern Europe, as the climate there is such that the proper quality of wheat can not be raised. Large quantities of durum wheats are now imported into France and Italy, from Russia and Algeria. These wheats make the best quality of macaroni, but owing to their scarcity they are frequently mixed with the softer wheats from western Europe. Durum wheat from Russian seed is being grown in France in considerable quantity, but the product even from the first year's crop is not equal to the Russian-grown wheat.

"There would seem to be no reason why there should not be a strong and increasing demand for American durum wheat to make good the deficiency in the European market."

#### HOME MARKET FOR MACARONI WHEAT.

Concerning the home market for durum wheats, Mr. M. A. Carleton, Cerealist of the U. S. Department of Agriculture, writes as follows:\*

"While the prospects are very good for a foreign market for these wheats sufficient to utilize probably all that we can produce for several years, an excellent market is also likely to be developed sooner or later in our own macaroni factories. At present all these factories, with rare exceptions, use the flour of common bread wheats in their operations. Of course this is chiefly due to the fact that heretofore it has been impossible to obtain true macaroni wheats in this country, and it is considered impracticable to import them. Most of the factories realize the importance of using semolino of such wheats as soon as they can obtain it in sufficient amount and of good quality. It will certainly be of the greatest advantage to the factories as well as to the growers to establish trade between them in the use of these wheats. The factories will thus be able to obtain either the wheats or semolino made from them at much less cost than the imported material, and the farmers will have the benefit of a quick home market.

"Another strong advantage in using these wheats in our own factories, and which especially effects the consumer, lies in the fact that the home-made product, other conditions being equal, is always much better from the standpoint of simple freshness. We all know how much better fresh bread is than old, and what a nutty flavor newly-made flour gives to the bread. These facts apply with even greater force in macaroni making. All imported macaronies must of necessity have lost a large per cent of their flavor, and as the homemade product is made almost entirely from common wheats, it follows that the majority of American people really have never tasted the very best macaroni.

"More than all else the use of macaroni as a food is far from general in this country, and should become more popular. It is a comparatively rare food with us. As already quoted in another place, in France alone the annual output of edible pastes is estimated at from 120,000,000 to 170,000,000 pounds. A considerable amount of this is, of course, exported, but there remains an enormous amount which is consumed in France.

\*U. S. Dept. of Agr., Bureau of Plant Industry; Bull. No. 3.

These pastes are among the most common and popular foods in that country. The same may be said of Italy. Let a sufficient amount of good wheat be grown and our factories begin producing from these wheats its best article possible, in a variety of forms, and there is no good reason apparent why such foods should not soon rank in popularity with our breakfast foods."

#### ONE HUNDRED AND ONE TESTS THROUGHOUT NEBRASKA.

The durum wheats distributed in the spring of 1902 consisted of a number of varieties, most of which were imported directly from Algeria and the remainder from Russia, except a small amount grown in this country. It is perhaps unfortunate that more of the seed was not of Russian origin, for the results indicate very plainly that it is more productive than that from Algeria. Previous experience has also shown that seed grown at least one year in this region gives larger yields than imported seed. This, together with the fact that the season was not such as has been considered favorable for the growth of this crop, has made the test a severe one.

Most of the experimenters received one bushel of seed which it was expected would be sown on one acre of land. No attempt was made to prescribe in what manner the land was to be prepared for the seed, or how the seed was to be sown. These and other unknown conditions that always enter into a test of this kind make it impossible to draw more than general conclusions, and make it desirable to report individual tests so far as space will permit. The following is the tabulated experience of each experimenter, omitting from necessity much interesting information that accompanied the report blanks from which this is compiled:

#### ADAMS COUNTY.

Experimenter.....	J. D. Evans.....	A. H. Farrens ..	Chas. Kidd.
Postoffice .....	Kenesaw. ....	Hastings. ....	Kenesaw.
Variety of wheat. ....	Kubanka. ....	Mahmoudi .....	Maraouani, from Algeria.
Sown on bottom or upland?..	Upland.....	Upland.....	Upland.
Nature of soil? .....	Loam with sand.	Loam.....	Clay.
Date of sowing?.....	Last week Mar. .	March 27. ....	March 8.
Amount of seed per acre?..	1 bushel .....	1 bushel .....	1 bushel
Good or poor stand? .....	Thin on ground..	Good stand.....	Poor stand.
Date of ripening? .....	Last of July. ....	.....	July 25.
Did it rust, smut, or lodge?...	Rusted badly. ....	Lodged badly... ..	Rusted.
Date of cutting? .....	.....	Did not cut .....	July 28.
Yield of grain per acre? .....	Did not thresh. .	Did not thresh..	40 bushels.
Comparison with other spring or winter wheat. ....	.....	.....	Better.



ADAMS COUNTY		BLAINE	BOX BUTTE CO
Experimenter.....	C. L. Mosier.....	E. D. Oldham ..	J. A. Smith.
Postoffice .....	Juniata. ....	Brewster. ....	Hemingford.
Variety of wheat. ....	Pelissier, mixed with Mahmoudi .	Kubanka. ....	Yellow Gharnov- ka.
Sown on bottom or upland? ..	Upland.....	2d bottom. ....	Part bot. run- ning upon slope.
Nature of soil? .....	Sandy loam ....	Sandy loam ....	Sandy loam.
Date of sowing? .....	April 21. ....	April 7. ....	April 7.
Amount of seed per acre? .....	1½ bushels. ....	1½ bushels. ....	1 bushel.
Good or poor stand? .....	Good. ....	Fair. ....	Could have been thicker.
Date of ripening? .....	.....	July 15. ....	August 1.
Did it rust, smut, or lodge? ..	All lodged. ....	No. ....	No, heads drop'd from weight.
Date of cutting? .....	Did not harvest.	July 29. ....	About Aug. 8.
Yield of grain per acre? .....	.....	19 bushels. ....	20 bushels.
Comparison with other spring or winter wheat. ....	.....	Better quality and yield. ....	Not so good.

BOYD COUNTY		BROWN CO.	
Experimenter.....	A. A. Cramer....	John Korab ....	W. D. McCord.
Post-office .....	Bristow. ....	Lynch. ....	Ainsworth.
Variety of wheat. ....	Pelissier. ....	Kubanka. ....	Kubanka.
Sown on bottom or upland? ..	Upland.....	Upland.....	Upland.
Nature of soil? .....	Gumbo .....	Gumbo and sandy loam. ..	Sandy loam.
Date of sowing? .....	April 4. ....	April 10. ....	March 28.
Amount of seed per acre? .....	1½ bushels. ....	1 bushel. ....	1 bu. on 1½ acres.
Good or poor stand? .....	Poor. ....	Medium.....	Good as could be expected for seed sown.
Date of ripening? .....	August 1. ....	July 20. ....	July 21.
Did it rust, smut, or lodge? ..	.....	Some smut. ....	No.
Date of cutting? .....	August 1. ....	July 26. ....	July 31.
Yield of grain per acre? .....	8 bushels. ....	25 bushels. ....	25 bu. from 1½ ac
Comparison with other spring or winter wheat. ...	Better than spg. wheat accord'g to stand.	Spring wheat, about 15-20 bushels.	Yield more than twice as much as spring wheat.

CLAY COUNTY			CUSTER CO.
Experimenter.....	Sam'l J. Case....	David Mitchell..	S. L. Glover.
Post-office.....	Sutton.....	Sutton.....	Weissert.
Variety of wheat.....	Pelissier.....	Richi.....	Kubanka.
Sown on bottom or upland?..	Low land.....	Upland.....	Upland.
Nature of soil?.....	Loam.....	Sandy loam.....	Loam.
Date of sowing?.....	March 10.....	First days April.	March 14.
Amount of seed per acre?.....	1½ bushels.....	½ bushel.....	1 bushel.
Good or poor stand?.....	Good.....	Good stand.....	Rather thin.
Date of ripening?.....	July 10.....	July 20.....	July 20.
Did it rust, smut, or lodge?..	No.....	No.....	Rusted.
Date of cutting?.....	July 15.....	July 21.....	20 to 25 July.
Yield of grain per acre?.....	6 bushels.....	About 5 bushels.	104 bu., 5 acres.
Comparison with other spring or winter wheat. {	Far better than spring wheat, as good as winter.	Not so good as winter grain.	Winter wheat, 25 35 bu., spring, 12-14 bu.

BUFFALO COUNTY.		BUTLER COUNTY.		CHERRY.
A. N. Gordon.....	Wm. Mueller....	John D. Hasik..	Mat Hasik.....	M. Hansen.
Kearney.....	Riverdale.....	Abie.....	Abie.....	Gordon.
Yellow Ghar- novka.....	Pelissier.....	Yellow Ghar- novka.....	Yellow Ghar- novka.....	.....
Bottom.....	Upland.....	Upland.....	Upland.....	Upland.
Loam.....	Loam.....	Dark Loam.....	Loam.....	Black Sandy loam.
March 20.....	March 22.....	March 27.....	April 1.....	April 11.
1 bushel.....	1 bu. to ¼ acre.	1½ bu.....	2 bushels.....	1 bushel.
Fair.....	Poor.....	Good.....	Medium.....	Very Poor.
July 8.....	August 1.....	July 15.....	July 15.....	Not known
No.....	Rusted.....	Very rusty.....	Good deal of rust	No.
July 8.....	August 1.....	July 18.....	July 18.....	Not known.
13 bushels.....	18 bushels.....	8 bu., 7 lbs.....	8 bushels.....	Estim. 1 bu.
Winter wheat, 30-35 bushels..	Spring wheat, 5-8 bu. Winter wheat, 30-40 bu.	Spring wheat, 10-20 bu., win- ter, 18-22 bu.	Not so good as sp'g wheat. Hurt by chinch bugs.	Not so good as the Sea Island.

CUSTER COUNTY.			DAWES CO.
C. R. Krenz. ....	P. H. Marley. ....	John Walker. ....	F. J. Coil.
Merna. ....	Mason City. ....	Mason City. ....	Hough.
Pelissier. ....	Yellow Gharnovka. ....	Richi. ....	Mohamed ben Bachir.
Upland. ....	Upland. ....	Upland. ....	Upland.
Clay. ....	Loam. ....	Loam. ....	Loam.
Mar. 31 and Apr. 26	May 1. ....	April 29. ....	March 24.
1 bushel. ....	1 bushel. ....	1 bushel. ....	5 bu. on 7 acres
Good. ....	Medium. ....	Good. ....	Good.
July 20. ....	July 21. ....	July 21. ....	August 9.
No. ....	Lodged some, but got all of it. ....	Lodged some, but got all of it. ....	No.
July 24. ....	July 21. ....	July. ....	August 9.
12 bushels. ....	16½ bushels. ....	20 bushels. ....	About 30-35 bu.
Leading wheat in this locality.	Wouldn't have raised 5 bu. of ordinary spring wheat sown at this time	Spring wheat sown at same time would not have yielded 5 bushels.	About twice as good.

DAWES COUNTY.		DAWSON CO.	DUNDY CO.
Experimenter. ....	J. F. Howard. ....	John Donelson. ....	M. W. Nesmith.
Post-office. ....	Whitney. ....	Farnam. ....	Calvert.
Variety of wheat. ....	Kubanka. ....	Yellow Ghar-novka. ....	Kubanka.
Sown on bottom or upland?	Bottom. ....	Upland. ....	Upland.
Nature of soil? . . . . .	Sandy loam. ....	Sandy Loam. ....	Rich dark loam.
Date of sowing? . . . . .	Early April. ....	April. ....	Early in April.
Amount of seed per acre? . . . . .	1 bushel. ....	14 lbs., $\frac{5}{8}$ acre. ....	$\frac{1}{2}$ bu., press drill
Good or poor stand? . . . . .	Good. ....	Good. ....	Good even stand
Date of ripening? . . . . .	July 25 to 30. ....	Cut down by hail	July 15 to 20.
Did it rust, smut, or lodge? . . . . .	No. ....	Slight rust. ....	No.
Date of cutting? . . . . .	July 30. ....	Think I would have had 10-15 bu. on $\frac{5}{8}$ acre	Killed by grass-hoppers.
Yield of grain per acre? . . . . .	29 bushels. ....		
Comparison with other spring or winter wheat? . . . . .			

## FURNAS COUNTY.

Experimenter.....	A. d'Allemand.	R. D. Griffith.	L. G. Knuppel.
Post-office.....	Arapahoe.....	Oxford.....	Beaver City.
Variety of wheat.....	Kubanba.....	Yellow Ghar-novka.....	Mahmoundi.
Sown on bottom or upland?..	Upland.....	Upland.....	Upland.
Nature of soil?.....	Sandy loam.....	Sandy loam.....	Sandy loam.
Date of sowing?.....	March 24.....	March 24.....	March 28.
Amount of seed per acre?..	1 bushel.....	1 bushel.....	1 bushel.
Good or poor stand?.....	Splendid.....	Part good.....	Fair.
Date of ripening?.....	Not quite ripe when cut.....	Cut little green..	July 10.
Did it rust, smut or lodge?..	No.....	Black rust.....	No.
Date of cutting.....	July 14.....	July 20.....	July 15.
Yield of grain per acre?.....	25 bushels.....	18 bushels.....	10 bushels
Comparison with other spring or winter wheat?.....	Yield better....	.....	About one-half yield.

FRANKLIN COUNTY		FURNAS COUNTY.	
Albert M. Averhoff.	Geo. R. Moore. ....	G. A. Anderson. ....	M. R. Crocker.
Franklin.....	Naponee.....	Wilsonville.....	Arapahoe.
Pelissier and Mah-moundi, mixed..	Pelissier.....	Pelissier.....	Pelissier.
Upland.....	Upland.....	Bottom.....	Upland.
Sandy loam.....	Clay loam.....	Black loam.....	Loam.
April 5.....	April 2.....	March 25.....	March 22.
1 bushel.....	1 bushel.....	1 bushel.....	1½ bushels.
Poor.....	Rather thin.....	Good.....	Rather thin.
Didn't wait for it to ripen.....	July 22.....	July 4.....	July 20.
No.....	No.....	Lodged badly.....	No.
July 15.....	July 22.....	July 17.....	July 20.
10 bushels.....	25 bushels.....	32 bushels.....	24 bushels.
Yield would have been great, but chinch bugs came.	Winter wheat, 25 to 40 bushels.	.....	No spring wheat in this locality. We used to think 15 bu. good.

## FURNAS COUNTY.

A. Meyerle. ....	G. A. Prime. ....	Mark Prime. ....	J. H. Rosenfeldt.
Holbrook. ....	Arapahoe. ....	Arapahoe. ....	Cambridge.
Kubanka. ....	Yellow Gharnovka..	Richi. ....	Kubanka.
Upland. ....	Upland. ....	Bottom. ....	Upland.
Black loam. ....	Loam. ....	Good soil. ....	Sandy loam.
March 7. ....	March 12. ....	April 25. ....	March 15.
1 bushel. ....	0.95 of bushel. ....	1 bushel. ....	3 pecks.
Rather thin. ....	Good. ....	Poor. ....	Good.
July 15. ....	July 14. ....	July 20. ....	Destroyed by cut- worms.
No. ....	No. ....	No. ....	.....
July 15. ....	July 14. ....	July 29. ....	.....
25 bushels. ....	17.55 bushels. ....	16 bushels. ....	.....
Av. yield spring wheat, 12 bu.	Spring wheat, 12 to 16 bu.; winter, 25 to 45 bu.	Poor, grasshoppers ate leaves.	.....

GAGE COUNTY.		GOSPER CO.	HALL CO.
Experimenter. ....	M. V. Nichols. .	Wm. Schievelbein	R. O. Adams.
Post-office. ....	Beatrice. ....	Arapahoe. ....	Grand Island.
Variety of wheat. ....	Richi. ....	.....	Pelissier.
Sown on bottom or upland? .	Medium upland.	Upland. ....	Upland.
Nature of soil? .	Black loam. ....	Sandy loam. ....	Sandy soil.
Date of sowing? .	April 4. ....	April 25. ....	April 19.
Amount of seed per acre? .	1 bushel. ....	$\frac{1}{2}$ acre, $\frac{1}{2}$ bu. ....	60 lbs. on $\frac{1}{2}$ acre.
Good or poor stand? .	Good. ....	Good. ....	Fair. .
Date of ripening? .	July 15. ....	July 5. ....	July 16.
Did it rust, smut, or lodge? .	No. ....	No. ....	Rusted and l'dg
Date of cutting? .	July 25. ....	July 15. ....	July 18.
Yield of grain per acre? .	9 bushels. ....	15 bu. from $\frac{1}{2}$ bushel seed.	10 bushels.
Comparison with other spring or winter wheat. ....	About one-third usual yield.	Ahead of other spring wheat.	Other wheat 20 to 40 bushels.

## HITCHCOCK COUNTY.

Experimenter.....	Jonas Lorance..	J. H. Ross.....	N. L. Wemple.
Post-office.....	Palisade.....	Culbertson.....	Culbertson..
Variety of wheat.....	Kubanka.....	Kahla.....	Kahla.
Sown on bottom or upland?..	Upland.....	Bottom land. ...	Bottom.
Nature of soil?.....	Loam.....	Sandy loam ..	Sandy loam.
Date of sowing?.....	.....	April 4. ....	April 7 to 10.
Amount of seed per acre?..	1 bushel.....	1 bushel.....	1 bushel.
Good or poor stand.....	Poor.....	Good.....	Good.
Date of ripening?.....	July 15.....	Did not ripen..	Did not ripen.
Did it rust, smut or lodge?..	No.....	.....	.....
Date of cutting?.....	July 15.....	.....	.....
Yield of grain per acre?..	.....	Destroyed by grasshoppers.	Destroyed by grasshoppers.
Comparison with other spring or winter wheat.....	About as good as any in locality.	.....	.....

## HALL COUNTY.

## HARLAN COUNTY.

H. W. Risley.....	Geo. T. Ashby.....	Geo. T. Ashby.....	R. J. Ashby.
Grand Island.....	Alma.....	Alma.....	Alma.
Mahmoudi.....	Richi.....	Adjini.....	Yellow Gharnovka.
Upland.....	Upland.....	Upland.....	Upland.
Sandy soil.....	Clay loam.....	Loam.....	Loam.
April 19.....	April 2.....	March 24.....	March 22.
60 lbs. $\frac{1}{4}$ acre.....	1 bushel.....	1 bushel.....	1 bushel.
Fair.....	Good.....	Good.....	Good.
July 16.....	July 20.....	July 17.....	July 17.
Rusted and lodged	No.....	No.....	No.
July 18.....	July 17.....	July 17.....	July 17.
10 bushels.....	8 bushels.....	33 bushels.....	7 bushels.
Other wheat, 20 to 40 bushels.	As good as winter, better than spring.	As good as best win- ter; bet. than spring	Better than spring wheat.

HITCHCOCK CO.	HOLT COUNTY.		
John M. Williams. . . . .	James A. Bibee. . . . .	Thomas Dillet. . . . .	George Jonas. . . . .
Culbertson. . . . .	Star. . . . .	Star. . . . .	Atkinson. . . . .
Kubanka and Richi mixed. . . . .	Richi. . . . .	Richi. . . . .	Pelissier. . . . .
Bottom. . . . .	Upland. . . . .	Upland. . . . .	Upland. . . . .
Sandy loam and gumbo. . . . .	Sandy loam. . . . .	Sandy loam. . . . .	Sand and alkali. . . . .
March 3. . . . .	April 20. . . . .	April 22. . . . .	March 24. . . . .
1 bushel. . . . .	2 bushels. . . . .	2 bushels. . . . .	1½ bushels. . . . .
Medium. . . . .	Good. . . . .	Good. . . . .	Good stand. . . . .
July 18. . . . .	July 18. . . . .	July 23. . . . .	July 23. . . . .
No. . . . .	No. . . . .	No. . . . .	Few smutty heads; lodged a little. . . . .
July 18. . . . .	July 20. . . . .	July 25. . . . .	July 26. . . . .
20 bushels. . . . .	20 bushels. . . . .	22 bushels. . . . .	25 bushels. . . . .
15 per cent better than spring wheat.	Better. . . . .	Better. . . . .	Spring wheat, 10 to 23; winter wheat, 15 to 20

## HOLT COUNTY.

Experimenter. . . . .	Theo. Kubart. . . . .	John Matejka. . . . .	Mathew Matejka. . . . .
Post-office. . . . .	Atkinson. . . . .	Atkinson. . . . .	Atkinson. . . . .
Variety of wheat. . . . .	Richi. . . . .	Pelissier. . . . .	Pelissier. . . . .
Sown on bottom or upland? . . . . .	Upland. . . . .	Bottom. . . . .	Bottom. . . . .
Nature of soil? . . . . .	Sand. . . . .	Blk. sandy loam . . . . .	Sandy loam. . . . .
Date of sowing? . . . . .	March 24. . . . .	April 11. . . . .	April 9. . . . .
Amount of seed per acre? . . . . .	¾ bu. per acre. . . . .	About 1½ bu. . . . .	1 bushel. . . . .
Good or poor stand? . . . . .	Fair. . . . .	Good. . . . .	Good. . . . .
Date of ripening? . . . . .	July 25. . . . .	July 25. . . . .	July 25. . . . .
Did it rust, smut or lodge? . . . . .	Lodged some. . . . .	No. . . . .	No. . . . .
Date of cutting? . . . . .	July 29. . . . .	July 29. . . . .	August 5. . . . .
Yield of grain per acre? . . . . .	19 bushels. . . . .	25 bushels. . . . .	20 bushels. . . . .
Comparison with other spring or winter wheat. . . . .	5 bushels better than other wheat. . . . .	. . . . .	5 to 10 bushels more than sp., 5 to 7 less than w

LINCOLN COUNTY.

Experimenter.....	J. and L. Brosius	B. W. Gosnell...	J. C. Gosnell.
Post-office.....	Whittier.....	Myrtle.....	Myrtle.
Variety of wheat.....	Adjini.....	Mohamed ben Bachir.....	Pelissier.
Sown on bottom or upland?..	Lowland.....	Upland.....	Upland.
Nature of soil?.....	Sandy loam.....	Sandy.....	Sandy.
Date of sowing?.....	April 14.....	Last of April..	Last of April.
Amount of seed per acre?....	3 pecks.....	3 pecks.....	3 pecks.
Good or poor stand?.....	Good.....	Fair.....	Fair.
Date of ripening?.....	.....	July 26.....	July 26
Did it rust, smut, or lodge?..	No.....	Rusted.....	Rusted.
Date of cutting?.....	July 26.....	August 1.....	August 1.
Yield of grain per acre?.....	30 bushels.....	10 bu., 3 pecks..	10 bu., 3 pks.
Comparison with other spring or winter wheat....	.....	Will outyield common wheat	Thin it will outyield com- mon wheat.

HOLT COUNTY.	HOWARD CO.	KEITH COUNTY.	
Anton Tresnak.....	John C. Herr.....	J. Heiser.....	A. P. Moore.
Atkinson.....	Farwell.....	Paxton.....	Brule.
Pelissier.....	Mahmoudi.....	Mahmoudi.....	Richi.
Bottom.....	Bottom.....	Upland.....	Upland.
Sandy loam.....	Black loam.....	Sandy.....	Sandy loam.
April 9.....	April 10.....	April.....	April 2.
1 bushel.....	1 bushel.....	1 bushel.....	1 bushel.
Good.....	Good.....	Good.....	Good.
July 26.....	Latter part of July.	July.....	July 31.
No.....	Rusted a little.....	No.....	No.
August 5.....	Latter part July....	July 15.....	Cut down by hail.
20½ bushels.....	20 bushels.....	15 bushels.....	.....
5 to 10 bu. more than common spring wheat.	Not so good as win- ter wheat.	Better.....	Up with winter wh.



## LOGAN COUNTY.

Arthur Clark.....	George Kramer. . . .	P. E. Tortel. . . . .	Simon Wright.
Gandy. . . . .	Gandy. . . . .	Gandy. . . . .	Gandy.
Adjini. . . . .	Yellow Gharnovko..	Yellow Gharnovka..	Adjini.
Upland. . . . .	Upland. . . . .	Upland. . . . .	Upland.
Dark clay. . . . .	Loam. . . . .	Loam. . . . .	Clay.
April 8. . . . .	April 20. . . . .	April 9. . . . .	April 10.
3 pecks. . . . .	1 bushel. . . . .	5 pecks. . . . .	3 pecks.
Good. . . . .	Good. . . . .	Fair. . . . .	Good.
July 10. . . . .	July 15. . . . .	August 5. . . . .	July 15.
Rusted. . . . .	No. . . . .	Some smut. . . . .	Rusted.
August 2. . . . .	July 15. . . . .	August 11. . . . .	July 28.
20 bushels. . . . .	17 bushels. . . . .	35 bushels. . . . .	18 bushels.
Better than spring wheat.	Better. . . . .	Better than spring, some winter wheat better.	Spring wheat, 10 to 12 bushels.

## MERRICK COUNTY.

## PERKINS COUNTY.

Experimenter. . . . .	J. J. Hurst. . . . .	J. S. Beck. . . . .	T. D. Casey.
Post-office. . . . .	Central City. . . . .	Grant. . . . .	Elsie.
Variety of wheat. . . . .	Yellow Ghar-novka. . . . .	Pelissier. . . . .	Pelissier.
Sown on bottom or upland? .	Bottom. . . . .	Upland. . . . .	Upland.
Nature of soil? . . . . .	$\frac{1}{2}$ on sand and alkali; $\frac{1}{2}$ on good black soil	Sandy loam. . . . .	Sandy loam.
Date of sowing? . . . . .	March 22. . . . .	March 29. . . . .	April 1.
Amount of seed per acre? . .	1 bushel. . . . .	Trifle over $1\frac{1}{2}$ bu	12 pounds
Good or poor stand? . . . . .	On alkali land, poor; good land, good.	Good. . . . .	Good.
Date of ripening? . . . . .	July. . . . .	.....	August 5.
Did it rust, smut, or lodge? .	Lodged badly. . . .	No. . . . .	No.
Date of cutting? . . . . .	Between July 15 and 3 . . . . .	.....	August 8.
Yield of grain per acre? . . .	.....	10 bushels. . . . .	10 bushels.
Comparison with other spring or winter wheat. . .	Winter wheat better. . . . .	Better than other wheat.	Better.

PHELPS COUNTY.		POLK CO.	RED WILLOW
Experimenter.....	J. D. Taylor.....	G. V. Rosene....	I. R. Andrews.
Post-office.....	Holdrege.....	Stromsburg....	Indianola.
Variety of wheat.....	Kubanka.....	Mahmoudi.....	Kubanka and Richi.
Sown on bottom or upland?..	Upland.....	Upland.....	Upland.
Nature of soil?.....	Loam.....	Sandy loam.....	Sandy loam.
Date of sowing?.....	March 12.....	March 31.....	April 18.
Amount of seed per acre?..	1 bushel.....	1 bushel.....	1 bushel.
Good or poor stand?.....	Good.....	Good.....	Good.
Date of ripening?.....	July 20.....	Never ripened well.....	July 5.
Did it rust, smut or lodge?..	Lodged.....	Lodged.....	No.
Date of cutting?.....	July 20.....	August 6.....	July 5.
Yield of grain per acre?..	28 bu., 40 lbs. .	3 bushels.....	15 bushels.
Comparison with other spring or winter wheat. .	Winter wheat, 30 to 40 bu.	Winter wheat on same elevation, 38 bu.	Other wheat about 10 bushel.

PERKINS COUNTY.		PHELPS COUNTY.	
Charles Eppler.....	S. Wall.....	S. G. Bergquist. . .	J. M. Hopkins.
Grant.....	Grant.....	Westmark.....	Atlanta.
Kahla.....	Pelissier.....	Mahmoudi.....	Kubanka.
Upland.....	Upland.....	Upland.....	Upland.
Sandy.....	Sandy loam.....	Sandy loam.....	Loam.
.....	March 27.....	March 25.....	March 12.
$\frac{3}{4}$ bushel.....	Little over $\frac{1}{2}$ bu. . .	1 bushel.....	1 bushel.
Thin.....	Poor.....	Thin.....	Good.
.....	July 25.....	July 23.....	July 16.
No; broken by hail.	No.....	Lodged.....	Lodged.
July 21.....	July 28.....	July 28.....	July 16.
.....	.....	22 bushels.....	33.20 bushels.
Better. . . . .	Superior.....	Winter wheat 42 bu; spring, 18; but little sown.	Spring wheat yielded 16.20 bushels.

## RED WILLOW COUNTY.

Stephen Bolles.....	Paul A. Hume.....	Butler Jones.....	W. A. McCool..
Boxelder.....	Indianola.....	Indianola.....	Indianola.
Yellow Gharnovka..	Pelissier.....	Pelissier and Kahla.....	Maraonani from Al- geria.
Upland.....	Upland.....	Upland.....	Bottom.
.....	Black loam.....	Sandy loam.....	Sandy loam.
March 24.....	March 20.....	April 5.....	March 1.
$\frac{1}{2}$ bushel.....	1 bu., $\frac{1}{2}$ acre.....	3 pecks.....	1 $\frac{1}{2}$ bushels.
Good.....	Medium.....	Good.....	Good.
July 19.....	July 10.....	July 10.....	.....
No.....	No.....	No.....	.....
July 19.....	July 12.....	July 10.....	.....
11 bushels.....	19 bu. on $\frac{1}{2}$ acre.....	20 bushels.....	Taken in June by grasshoppers.
Spring wheat, 6 bushels.	Other wheat, 12 to 25 bushels.	Shows indication of being far super- ior.	.....

## RED WILLOW COUNTY.

## SALINE COUNTY.

Experimenter.....	Geo. Maisel.....	J. W. Ingles.....	M. O. Johnson.
Post-office.....	Indianola.....	Pleasant Hill...	Crete.
Variety of wheat.....	Pelissier.....	Mahmoudi.....	Mahmoudi.
Sown on bottom or upland?	Upland.....	Upland.....	Upland.
Nature of soil?.....	Good black soil	.....	Sandy loam..
Date of sowing.....	First half April..	March 22.....	April 4.
Amount of seed per acre?..	1 bushel.....	7 pecks.....	1 bushel.
Good or poor stand?.....	About half stand	Good.....	Good.
Date of ripening?.....	July 10.....	July 13.....	.....
Did it rust, smut or lodge?..	No.....	Smut, $\frac{1}{2}$ head.....	.....
Date of cutting?.....	July 10.....	July 22.....	.....
Yield of grain per acre?.....	24 bushels.....	19 bushels.....	Destroyed by grasshoppers.
Comparison with other spring or winter wheat.....	Better.....	.....	.....

SEWARD COUNTY.		SHERIDAN COUNTY.	
Experimenter.....	Jay Oliver.....	J. W. Burrows..	James Egan.
Post-office.....	Utica.....	Hay Springs....	Albany.
Variety of wheat.....	Mahmoudi.....		Yellow Ghar- novka.
Sown on bottom or upland?..	Upland.....	Upland.....	Upland.
Nature of soil.....	18-in. blk. loam.	Sandy loam....	Clay and sand.
Date of sowing?.....	March 29.....	April 27.....	April 27.
Amount of seed per acre?..	1 bushel.....	1 bushel.....	1 bushel.
Good or poor stand?.....	Poor.....	Good.....	Splendid.
Date of ripening?.....	July 10.....		July 20.
Did it rust, smut or lodge...	Rusted and lod- ged badly....	No.....	No.
Date of cutting?.....	July 10.....	August 5.....	August 5.
Yield of grain per acre?.....	Never threshed; too wet.....	Too poor to thresh.....	36 bu., 4 lbs.
Comparison with other spring or winter wheat.....			Better....

SCOTTS BLUFF COUNTY			SEWARD CO.
A. V. Fife.....	J. L. Gilmore.....	Fred Katzer.....	James Krenk.
Gering.....	Caldwell.....	Caldwell.....	Dwight.
Black Don from Russia.....	Adjini.....	Mahmoudi.....	
Upland.....	Bottom.....	Bottom.....	Bottom.
Sandy loam.....	Sandy loam.....	Sandy loam.....	Clay.
April 20.....	April 18.....	April 1.....	April 1.
1 bushel (about)....	1 bushel.....	1½ bushels.....	1 bushel.
Pretty fair.....	Rather poor.....	Fairly good.....	Good.
July 20.....	Aug. 10, not all ripe	July 25.....	
No.....	No.....	No.....	
July 26.....	August 10.....	July 25.....	
20 bushels.....	14 bushels.....	25 bushels.....	Destroyed by chinch bugs.
	Spring wheat about same.....	Compared favorably with other wheat.	

SHERIDAN COUNTY			SHERMAN CO.
Elmer E. Randall . . .	Jules A. Sandoz. . .	A. F. Smith. . . . .	E. H. Kittell.
Colcleesser . . . . .	Colcleesser . . . . .	Hay Springs. . . . .	Rockville.
Pelissier . . . . .	Yellow Gharnovka . .	Yellow Gharnovka. .	
Upland. . . . .	Upland. . . . .	Upland. . . . .	Upland.
Dark Sandy loam. . .	Clay or gumbo. . . .	Sandy loam . . . . .	Loam.
April 7. . . . .	April 8. . . . .	April 24. . . . .	April 1.
1 bushel . . . . .	$\frac{1}{2}$ bu. per acre. . . . .	1 bushel . . . . .	$\frac{1}{2}$ bushel.
Very good. . . . .	Good. . . . .	Fair, but little thin .	Poor.
About August 1 . . .		August 11. . . . .	August 5.
Some rust. . . . .	No. . . . .	Lodged some. . . . .	Rusted.
Early in August. . .		August 11 and 12. . .	August 5.
11 $\frac{1}{2}$ bushels . . . . .	5 bushels . . . . .	18 $\frac{1}{2}$ bushels . . . . .	
Velvet chaff blue stem yielded 17 bu. .			Quality inferior.

SHERMAN COUNTY		STANTON CO.	THAYER CO.
Experimenter. . . . .	T. D. Wilson . . .	H. E. Scripture.	A. P. Hazard.
Post-office. . . . .	Ashton . . . . .	Stanton. . . . .	Hebron.
Variety of Wheat . . .	Mahmoudi . . . . .	Kahla . . . . .	Marsouni from Al- geria.
Sown on bottom or upland .	Bottom. . . . .	Second bottom. . .	Upland.
Nature of soil?. . . . .	Loam. . . . .	Clay. . . . .	Loam.
Date of sowing?. . . . .	March 28. . . . .	March 26. . . . .	Nov. 2, fall; April 13, spring.
Amount of seed per acre?. .	1 bushel . . . . .	1 bu. on $\frac{1}{2}$ acre. . .	$\frac{1}{2}$ bushel in all.
Good or poor stand?. . . .	Poor . . . . .	Poor . . . . .	Good.
Date of ripening? . . . . .	July 23. . . . .	July 22. . . . .	Can't tell.
Did it rust, smut, or lodge?.	Lodged badly. . . .	Some rust. . . . .	No.
Date of cutting? . . . . .	July 23. . . . .	July 28. . . . .	
Yield of grain per acre?. . .	10 bushels, poor . .	18 bushels. . . . .	3 $\frac{1}{2}$ bu. seed on $\frac{1}{2}$ acre.
Comparison with other spring or winter wheat. .	Winter wheat, 30 bu; spg. 10 bu. . .		As good as any.

WEBSTER COUNTY		YORK COUNTY	
Experimenter .....	Rudolph Frey ..	Morrison Castle..	John S. Welty.
Post-office .....	Guiderock. ....	. York. ....	Gresham.
Variety of wheat. ....	Velvet Don from Russia. ....	Richi. ....	Yellow Gharnovka.
Sown on bottom or upland?	Upland. ....	Upland. ....	Upland.
Nature of soil? .....	Sandy loam ....	Sandy loam ....	Loam.
Date of sowing? .....	March 10. ....	March 22. ....	March 13.
Amount of seed per acre? ..	1½ bushels. ....	1½ bushels. ....	1½ bushels.
Good or poor stand? .....	Medium. ....	Medium. ....	Fair.
Date of ripening? .....	July 15. ....	July 10. ....	July 21.
Did it rust, smut, or lodge?.	No. ....	Little smut, lodg- ed badly. ....	Lodged.
Date of cutting? .....	July 15. ....	July 11. ....	July 22.
Yield of grain per acre? ..	22 bushels. ....	12 bushels. ....	18 bushels.
Comparison with other spring or winter wheat. ....	Three times as much as winter wheat.	Think other wheat better.	.....

## VALLEY COUNTY.

Mrs. M. A. Barker? .....	Joseph Masin. ...	Vincent Masin... ..	E. A. Russell.
North Loup. ....	Ord. ....	Ord. ....	Ord.
Yellow Gharnovka .....	Pelissier. ....	Pelissier. ....	Yellow Gharnovka.
Upland. ....	Upland. ....	Bottom. ....	Upland.
Sandy black loam. ....	Black soil. ....	Black soil. ....	Loam.
April 1. ....	April 7. ....	April 17. ....	April 1.
1½ bushels. ....	1 bushel. ....	1 bushel. ....	Bushel.
Good. ....	Good. ....	Good. ....	Good, little thin.
July 24. ....	July 28. ....	August 15. ....	July 26.
No. ....	Little. ....	Lodged. ....	Lodged little.
July 24. ....	July 28. ....	August 15. ....	July 26.
30 bu.; sowed 1 bu. on ¼ ac.	16 bushels. ....	30 bushels. ....	24 bushels.
Velvet chaff, 8 to 15 bu.	Way ahead of other spring and winter wheat.	About same as winter wheat.	Far superior to spring wheat.

## DISCUSSION OF TABULATED REPORTS.

The reports on the productiveness of durum wheats as compared with other spring and with winter varieties are quite conflicting. In order to afford a clearer basis for comparison, they have been tabulated by counties as follows:

	As good as or better than spring wheat	As good as or better than winter wheat	Poorer than spring wheat	Poorer than winter wheat
Adams .....	1	1	..	..
Blaine .....	1	1	..	..
Box Butte .....	..	..	1	1
Boyd .....	2	..	..	..
Brown .....	1	..	..	..
Buffalo .....	1	..	..	2
Butler .....	..	..	2	1
Cherry .....	..	..	1	..
Clay .....	1	1	..	1
Custer .....	4	1	..	1
Dawes .....	1	1	..	..
Franklin .....	..	..	..	1
Furnas .....	3	1	1	2

	As good as or better than spring wheat	As good as or better than winter wheat	Poorer than spring wheat	Poorer than winter wheat
Gage .....	..	..	1	1
Gosper .....	1	..	..	..
Hall .....	..	..	1	1
Harlan .....	3	2	..	..
Hitchcock .....	2	1	..	..
Holt .....	4	3	..	1
Howard .....	..	..	..	1
Keith .....	1	2	..	..
Lincoln .....	2	2	..	..
Logan .....	4	1	..	1
Merrick .....	..	..	..	1
Perkins .....	4	4	..	..
Phelps .....	2	..	..	2
Polk .....	..	..	..	1
Red Willow .....	5	4	..	..
Scotts Bluff .....	2	1	..	..
Sheridan .....	1	1	1	..
Sherman .....	1	..	1	2
Thayer .....	1	1	..	..
Valley .....	3	2	..	..
Webster .....	..	1	1	1
All counties in which tested .....	51	31	10	21

The average yield of winter wheat in Nebraska for 1902 was, according to Bulletin No. 2 (Sept., 1902) of the Nebraska Bureau of Labor and Industrial Statistics, 24 bushels per acre, and of spring wheat 12 bushels. The average yield for all durum wheats tested in 1902 was 18.3 bushels per acre. The durum wheats were grown principally in western counties, while the others were distributed over the state.

From the data at hand it is safe to say that durum wheats yield better than other spring varieties, but how they compare in this respect with winter wheat in western Nebraska can not be definitely stated at this time.

There were a number of reports of the durum wheats having rusted and lodged. Those raised at the Station were very badly rusted, and also lodged in places. They appeared to be fully as susceptible to rust as other varieties of spring wheats.

The average time of ripening was July 16, both for the tests made throughout the state, and for those made at the Station. The average time of ripening for sowings made before April 1 was the same as for those made after April 1.

The average yield of all sowings made before April 1 was 19.5 bushels per acre; of all sowings made after April 1, 17.5 bushels per acre. This indicates that, for at least the year reported, early planting was desirable. As macaroni wheats are not easily injured by frost, this rule will doubtless hold good for all ordinary years.

The average yield per acre and number of tests of each variety were as follows:

Variety	Origin	Yield per acre	Number of trials
Kubanka.....	Russia.....	25.0 bu.	9
Mahmoudi.....	Algeria.....	14.9 bu.	9
Maraounai.....	Algeria.....	26.5 bu.	2
Pelissier.....	Algeria.....	17.8 bu.	22
Richi.....	Algeria.....	14.6 bu.	9
Mohamed ben Bachir.....	Algeria.....	16.9 bu.	2
Yellow Gharnovka.....	Russia.....	17.4 bu.	16
Adjini.....	Algeria.....	23.0 bu.	5
Kahla.....	Algeria.....	18.0 bu.	1
Black Don.....	Russia.....	20.0 bu.	1
Velvet Don.....	Russia.....	22.0 bu.	1

Omitting varieties of which there were less than five tests, the average yield per acre for the Russian varieties was 21.2 bushels, and for the Algerian varieties 17.6 bushels.

A test of a number of varieties of durum wheats was made at the Experiment Station. The unusually wet weather and hard wind storms interfered much with the growth of the wheats, and doubtless decreased the yields. The test is therefore of less value than it would have been in a normal season. All varieties were planted March 20 to 27 and were put in with a press drill.



Variety	Origin	Yield per acre	Pounds per bushel
Pererodka. ....	Russia. ....	14.0 bu.	49
Velvet Don. ....	Russia. ....	9.0 bu.	53
Gharnovka. ....	Russia. ....	16.5 bu.	51
Yellow Gharnovka. ....	Russia. ....	14.5 bu.	55
Velvet Don. ....	Russia. ....	10.5 bu.	54
Gharnovka. ....	Russia. ....	12.0 bu.	55
Kubanka. ....	Russia. ....	12.5 bu.	59
Maraouni. ....	Algeria. ....	7.3 bu.	44
Kahla. ....	Algeria. ....	7.3 bu.	49
Richi. ....	Algeria. ....	8.0 bu.	49
Black Don. ....	Russia. ....	12.0 bu.	56
Mahmoudi. ....	Algeria. ....	6.3 bu.	43
Kahla. ....	Algeria. ....	8.0 bu.	46
Adjini. ....	Algeria. ....	9.0 bu.	50
Mohamed ben Bachir. ....	Algeria. ....	11.3 bu.	52
Yellow Gharnovka. ....	Russia. ....	13.3 bu.	54
Pelissier. ....	Algeria. ....	7.7 bu.	45

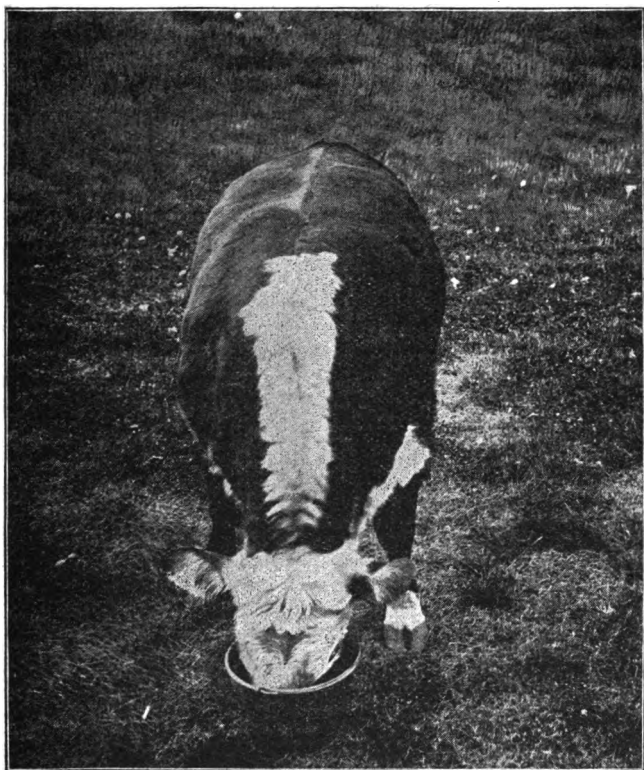
While the variety tests at the Station is not very satisfactory as indicating the variety best adapted to our conditions, it brings out strongly the superiority of the Russian varieties. Thus, the average yield for all Russian varieties is 12.7 bushels per acre, and for all Algerian varieties 8.1 bushels.

## FEEDING EXPERIMENTS WITH CATTLE AND PIGS.

### EXPERIMENT I.

#### ALFALFA VS. SORGHUM FOR WINTERING CALVES.

BY PROF. E. A. BURNETT AND H. R. SMITH, NEBRASKA EXPERIMENT STATION.



CURLY, FIRST IN HEREFORD "SPECIAL," AT INTERNATIONAL, CHICAGO, 1901.

In October, 1900, eighteen steer calves were purchased from the Stanton Breeding Farm Company, Madison, Nebr., for experimental feeding. Two heifers were also included, which figure in the summer feeding tests of 1901. Twelve of the steers and the two heifers were grade Hereford and six of the steers were grade Shorthorn. These twenty head were selected from a

bunch of about 250 head and represented fairly uniform size and quality, being from pure bred sires and out of cows having at least one cross of the same blood, making these calves at least three-quarters Hereford or Shorthorn, as the case might be.

No special breed test was made with these steers, but in each experiment carried on, except the first, the Shorthorns and Herefords were generally equally divided, placing an equal number of Shorthorns and Herefords in each lot. In the first experiment an opportunity is given to compare six Shorthorns with six Herefords on the same feed.

The calves were received at the University farm October 1, 1900. They were placed on a clover and mixed grass pasture. On October 15 they were given a small ration of grain consisting of one-half corn, one-fourth bran and one-fourth oats, which was increased gradually until, on November 1, they were eating two and one-half pounds each per day. On October 19 these calves weighed 6,780 pounds, or 339 pounds each. During the month of November they received alfalfa hay with an increasing grain ration until, November 30, they were eating five pounds each per day and weighed 7,425 pounds.

On December 1, 1900, the steers were divided into three lots of six steers each.

Lot 1, six Shorthorn steers, weighed 2,515 pounds.

Lot 2, six Hereford steers, weighed 2,485 pounds.

Lot 3, six Hereford steers, weighed 2,425 pounds.

Lots 1 and 2 received alfalfa hay and a grain ration.

Lot 3 received sorghum hay and the same grain ration, which consisted of one-half corn, one-fourth oats and one-fourth bran. Beginning with a grain ration of five pounds each per day and a hay ration of six pounds each per day, the grain ration was gradually increased to eight pounds each per day and continued at that rate until April 20, 1901, when the experiment was terminated on account of dehorning, which caused a considerable shrinkage in weights that was not recovered until after they were turned on grass May 4, 1901.

TABLE I.—*Alfalfa vs. sorghum for calves.*

Lot	No in lot	Grain	Alfalfa hay	Sorghum hay	Last weight	First weight	Total gain	Average gain
Shorthorn.....	6	6195	7098	.....	3930	2515	1415	236
Hereford 2.....	6	6195	7098	.....	3950	2485	1465	244
Hereford 3.....	6	6195	.....	7098	3735	2425	1310	218
Total for each steer.....		1032	1183	.....	.....	.....	.....	.....

Average gains on alfalfa and grain, 240 pounds.

Average gains on sorghum hay and grain, 218 pounds.

Gain of alfalfa over sorghum, 22 pounds per calf in five months.

## EXPERIMENT II.

## GRAIN VS. NO GRAIN FOR STEERS ON PASTURE.

E. A. BURNETT.

On May 4 these lots were redivided, one-half of the sorghum-fed steers and one-half of the alfalfa-fed steers being placed on pasture only, while the other half were fed grain with pasture throughout the summer. This placed nine steers in each lot, but the grain-fed lot was added to by two Aberdeen-Angus steers which were purchased in April.

## STEERS ON PASTURE.

On May 4, 1901, nine steers weighing 5,545 pounds, or an average of 616 pounds each, were placed in a sixteen-acre pasture containing brome grass, mixed grasses, and three acres of alfalfa. Two acres of this field was newly seeded and furnished very little pasture during the summer. On account of the extreme drought of 1901, the feed became very short during the latter part of August, but with the rains of early September the pasture improved, especially the alfalfa, and there was fair pasture in the field at the time they were removed, November 1, 1901.

## STEERS ON GRAIN.

The nine steers on grain, which were to be compared with the nine on pasture, weighed 5,485 pounds, or an average of 609 pounds each. To the nine steers were added two Angus steers weighing an average of 600 pounds each, making eleven head. These eleven steers were placed on grain and pasture May 4 and had the run of about thirteen acres of low bottom land until August 15, when they were given another pasture for forty-five days and returned to their original pasture about October 1, after it had been improved by autumn rains.

For the sake of comparison, the records of weights were so kept as to determine the gains of different steers. It will be seen that while the gain of the steers wintered on sorghum hay was less during the winter than those wintered on alfalfa, the summer gains of these sorghum-fed steers was enough greater to overcome their smaller gains of the previous winter and to place them on even weights with the alfalfa-fed steers by the end of the pasture season.

The grain ration from May 4 to August 17 consisted of corn meal. On this date the ration was changed to 75 per cent corn and 25 per cent bran, which was continued until November 1 without change. During the entire period each steer on grain consumed 1,893 pounds of corn meal and 260 pounds of bran.

In the financial statement corn is valued at 40 cents per bushel, bran at \$16 per ton, and pasture at \$3 per acre.

TABLE II.—*Grain vs. no grain on pasture.*

Lot	Ear tag numbers	Grade	Winter roughness	Summer grain, av. per lot	Last weight	First weight	Gain of lot	Average gain	Av. all on pasture	Av. weight Nov. 11, '01
4	1-2-6	Shorthorn. ....	Alfalfa. ....	None	2740	1875	865	288	.....	913
5	8-9-11	Hereford. ....	Alfalfa. ....	None	2750	1910	840	280	.....	916
6	13-15-16	Hereford. ....	Sorghum. ....	None	2685	1760	925	308	292	895
Total (9 head) .....					8175	5545	2630	.....	.....	.....
7	3-4-5	Shorthorn. ....	Alfalfa. ....	6459	2940	1870	1070	353	On grain	980
8	7-10-12	Hereford. ....	Alfalfa. ....	6459	3175	1850	1325	441	.....	1058
9	14-17-18	Hereford. ....	Sorghum. ....	6459	3020	1765	1255	414	.....	1006
10	29-31	Angus steers. ....	Notknown	4306	2020	1200	820	410	404	1010
Total (11 head) .....					23683	11155	6685	4470	.....	.....
Average pounds grain consumed. .					2153	.....	.....	.....	.....	.....

## FINANCIAL STATEMENT BY LOTS.

May 4	To lots 4, 5 and 6, nine steers, on grass only, 5545 pounds at 5 cents. ....	\$277.25	
	To 16 acres pasture at \$3. ....	48.00	
	To profit on nine steers. ....	18.10	
Nov. 1	By nine steers, 8175 pounds, at \$4.20. ....		\$343.35
		\$343.35	\$343.35
May 4	To Lots 7, 8 and 9, nine steers, 5485 pounds, at 5 cents. ....	\$274.25	
	To 11 acres pasture. ....	30.00	
	To 2340 pounds bran at 80 cts. per 100 pounds	18.72	
	To 305.4 bushels corn at 40 cts. per bushel. .	122.16	
	To profit on nine steers. ....	48.16	
	By nine steers, 9135 pounds, at \$5.40. ....		\$493.29
		\$493.29	\$493.29
May 4	To 2 Angus steers, 1200 pounds, at 5 cts. ....	\$60.00	
	To pasture. ....	6.66	
	To 520 pounds bran at 80 cts. per 100 pounds	4.16	
	To 67.86 bushels corn at 40 cts. per bushel. .	27.14	
	To profit on two steers. ....	11.12	
	By two steers, 2020 pounds, at \$5.40. ....		\$109.08
		\$109.08	\$109.08

The prices on these two lots of steers were estimated by Mr. Albert Noe, with Clay, Robinson & Company, South Omaha, on November 1 at \$4.00 per hundred pounds for the grass steers and \$5.75 per hundred pounds for the grain-fed steers in Omaha on that date. These values were varied by

charging the cost of delivering the grain-fed steers in Omaha at 35 cents per hundred, making them worth \$5.40 at the farm, and by adding the cost of freight to the grass or feeding cattle, which would have made them cost about \$4.20 per hundred delivered at the farm.

#### CONCLUSIONS.

1. This experiment shows that when steers are to be marketed in the fall or early winter there is more profit in summer feeding with grain on pasture. Where steers are to be winter-fed on grain for a spring market, there is more profit to feed no grain on pasture. See Experiment III.

2. The failure of the corn crop of 1901 made the market for feeding steers very bad and destroyed the profit that would ordinarily have been produced on a bunch of cattle making 292 pounds gain in six months on pasture only, but the subsequent winter feeding was very profitable and warranted placing a higher value on these steers as feeders.

3. The high price of fat cattle permitted us to sell the grain-fed cattle at a profit even after having fed them on corn worth forty cents per bushel during the summer.

#### EXPERIMENT III.

##### WHEAT VS. CORN IN A RATION FOR FATTENING STEERS.

E. A. BURNETT.

H. R. SMITH.

On November 1, 1901, the 20 steers that had been on the Grain vs. No Grain experiment during the summer were taken to the yards to prepare for an experiment on the relative feeding value of wheat and corn in a grain ration. Eighteen of these steers were grade Hereford and Shorthorn and two were grade Angus. Eleven had been grain fed during the summer and were divided into Lots 1 and 2. Nine head had been on pasture only and were divided into Lots 3 and 4.

Lot 1 contained six steers for Period I and four steers for Period II.

Lot 2 contained five steers for Period I and four steers for Period II.

Lot 3 contained five steers for both Period I and Period II.

Lot 4 contained four steers for both Period I and Period II.

These steers were given a four weeks' preliminary feeding period before the experiment proper commenced. During this time the steers in Lots 1 and 2 gained 36 pounds each and those in Lots 3 and 4 gained 72 pounds each, which should be taken into account in a six-months' feeding period or in a financial statement.

The experiment proper is divided into two periods, Period I of 11 weeks and Period II of 12 weeks.

The ration for Period I was as follows:

Lots 1 and 3 received a grain ration 80 per cent wheat and 20 per cent bran.

Lots 2 and 4 received a grain ration 80 per cent corn and 20 per cent bran.

All lots received alfalfa hay for roughness. On February 7, 1902, two of

the best steers were withdrawn from Lot 1 and one from Lot 2 to use for class-room instruction, leaving them with four steers in each lot, and the first experimental period was closed.

The ration for Period II was as follows:

Lots 1 and 3 received a grain ration of 70 per cent wheat, 15 per cent corn and 15 per cent oil meal.

Lots 2 and 4 received a grain ration of 70 per cent corn, 15 per cent wheat and 15 per cent oil meal. All lots received about one-half their roughness in alfalfa hay, one-fourth in prairie hay and one-fourth in wheat straw. Each steer consumed about half as much roughness as grain.

These steers were followed by twenty pigs weighing 1370 pounds when the experiment commenced, one pig with each steer. The pigs were fed an additional grain ration of 2878 pounds of shorts for the entire 23 weeks and made a gain of 1340 pounds. Valuing the pigs at \$4.50 per hundred pounds at the beginning of the experiment and at their market value of \$6.00 per hundred pounds at the close of the experiment, they made a net profit of \$72.17, which is credited to the steers. The price, \$6.00, is fixed as the market value because these pigs were still too small to market. They were fed on experiment to July 21, and sold at \$7.00 per hundred as reported in Experiment VIII, "Corn vs. wheat for pigs on alfalfa pasture."

During the period when alfalfa only was fed as roughness, the steers were often in too laxative a condition to produce the best results, and the addition of prairie hay and wheat straw in the ration overcame this trouble in the second period of the experiment.

The steers which had been summer fed on grain should more properly have been sold for beef in early winter, but as they were only 18 months old and weighed only 1050 pounds when the experiment commenced, November 30, 1901, we desired to feed them through the winter. The main object in this feeding was to get a comparison between the cost of gains on long-fed steers and short-fed steers of the same age. We also wished to determine how much difference there would be in the weight and killing value of yearling steers that had been fed continuously for 18 months, compared with those that had been on pasture only during the summer and were fed for a six-months' winter period.

It is worthy of note that these steers consumed a relatively small amount of grain when compared with ordinary steers in the feed lot. At no time did they consume more than 17 pounds average grain per day, whereas mature steers on full feed often consume 24 to 30 pounds of shelled corn and from 20 to 25 pounds of ground corn per day. See Table III.

These steers were sold in South Omaha, May 8, 1902, by Clay, Robinson & Company.

Lots 1 and 2 weighed 1320 pounds average in Omaha and sold for \$7.10. Lots 3 and 4 weighed 1298 pounds average and sold for \$6.90. Deducting the cost of freight, commission, shrinkage, etc., which amounted to 23 cents per hundred pounds, gave us a net price at the farm of \$6.87 per 100 pounds on the long-fed and \$6.67 per hundred pounds on the short-fed cattle, which

is the price figured in the financial statement. These steers were just about 24 months average age and were classed as long yearlings.

Lots 1 and 2 had been fed grain continuously from weaning time, consuming in all 5790 pounds. Lots 3 and 4 were fed grain during the first winter and again from November 1, 1901, to the time of selling. They consumed in all 3685 pounds of grain from weaning time to the time they were sold.

These steers were sold to Cudahy & Company and were slaughtered for export. After cooling, Lots 1 and 2, which weighed 1320 average alive, dressed 64.48 per cent of their live weight.

Lots 3 and 4, which weighed 1298 average alive, dressed 62.28 per cent of live weight.



TABLE III.—Wheat vs. corn. Food consumed and gains.

Lot	No. in lot	Wheat	Corn	Bran	Oil meal	Total grain	Alfalfa	Prairie hay	Straw	Total roughness	Last weight	First weight	Gain	Grain consumed per lb. gain	Food consumed per lb. gain
Period I (11 weeks)															
1, Wheat.....	6	4896	.....	1225	.....	6121	4212	.....	.....	4212	7245	6445	800	7.65	12.9
2, Corn.....	5	.....	4082	1021	.....	5103	3510	.....	.....	3510	5845	5100	745	6.85	11.56
3, Wheat.....	5	4196	.....	1049	.....	5245	3510	.....	.....	3510	5850	4925	925	5.67	9.46
4, Corn.....	4	.....	3382	846	.....	4228	2808	.....	.....	2808	4560	3900	660	6.40	10.66
Total.....	20	9092	7464	4141	.....	20697	14040	.....	.....	14040	23500	20370	3130	.....	.....
Period II (12 weeks)															
1, Wheat.....	4	3439	737	.....	736	4912	1404	792	584	2780	5390	4745	645	7.61	11.93
2, Corn.....	4	737	3439	.....	736	4912	1404	792	584	2780	5288	4770	518	9.48	14.85
3, Wheat.....	5	4820	1033	.....	1032	6885	1730	990	730	3450	6668	5850	818	8.41	12.63
4, Corn.....	4	821	3834	.....	821	5476	1404	792	584	2780	5203	4560	643	8.51	12.84
Total.....	17	9817	9043	.....	3325	22185	5942	3366	2482	11790	.....	.....	2624	8.45	12.52
Grand total.....	.....	18909	16507	4141	3325	42882	19982	3366	2482	25830	.....	.....	5754	7.43	11.94

Average gain of wheat over corn, first period ..... 4 pounds.  
 Average gain of wheat over corn, second period ..... 34 pounds.  
 Average gain of wheat over corn, entire experiment ..... 38 pounds.

TABLE IV.—Food consumed and gains by one steer.

Lot	Average amount of grain consumed by each steer during period.					Average amount of roughness consumed by each steer during period.				Average weight at close	Average weight at beginning	Average gain
	Wheat	Corn	Bran	Oil meal	Total grain	Alfalfa	Prairie hay	Straw	Total roughness			
Lot 1, 6 steers, wheat. ....	Lbs. 816	.....	Lbs. 204	.....	Lbs. 1020	702	.....	.....	Lbs. 702	Lbs. 1207	Lbs. 1074	Lbs. 133
Lot 2, 5 steers, corn. ....	.....	816	204	.....	1020	702	.....	.....	702	1169	1020	149
Lot 3, 5 steers, wheat. ....	839	.....	210	.....	1049	702	.....	.....	702	1170	985	185
Lot 4, 4 steers, corn. ....	.....	845	211	.....	1056	702	.....	.....	702	1140	975	165
Av. Lots 1 and 3, wheat. ....	826	.....	207	.....	1033	702	.....	.....	702	1190	1034	156
Av. Lots 2 and 4, corn. ....	.....	830	207	.....	1037	702	.....	.....	702	1155	1000	155
Lot 1, 4 steers, wheat. ....	860	184	.....	184	1228	351	198	146	695	1347	1186	161
Lot 2, 4 steers, corn. ....	184	860	.....	184	1228	351	198	146	695	1322	1192	180
Lot 3, 5 steers, wheat. ....	964	206	.....	206	1376	346	198	146	690	1334	1170	164
Lot 4, 4 steers, corn. ....	205	958	.....	205	1368	351	198	146	695	1301	1140	161
Av. Lots 1 and 3, wheat. ....	918	190	.....	196	1310	348	198	146	692	1339	1177	162
Av. Lots 2 and 4, corn. ....	194	909	.....	194	1297	351	198	146	695	1311	1166	145

Period I.—11 weeks, Dec. 1, '01, to Feb. 14, '02.  
 Period II.—12 weeks, Feb. 14, '02, to May 3, '02.

TABLE V.—*Food consumed and gains by one steer for both periods.*

Lot	Average amount of grain consumed by each steer during the 23 weeks					Average amount of roughness consumed by each steer during the 23 weeks				Average gain, 23 weeks	Food consumed per lb. gain
	Wheat	Corn	Bran	Oil meal	Total grain	Alfalfa	Prairie hay	Straw	Total roughness		
Lot 1, wheat. . .	Lbs. 1676	Lbs. 184	Lbs. 204	Lbs. 184	Lbs. 2248	Lbs. 1053	Lbs. 198	Lbs. 146	Lbs. 1397	Lbs. 294	Lbs. 12.40
Lot 2, corn. . . .	184	1676	204	184	2248	1053	198	146	1397	279	13.28
Lot 3, wheat. . .	1803	206	210	206	2425	1048	198	146	1392	349	11.11
Lot 4, corn. . . .	205	1803	211	205	2424	1053	198	146	1397	326	11.80

Food consumed per pound of gain, both periods { by wheat steers. 11.85 pounds  
by corn steers, 12.48 pounds

All lots were of the same age and had been under the same conditions *except* that they had received no grain during the previous summer. Charging all the grain eaten, we find that each steer in Lots 1 and 2, with a grain-feeding period of 18 months, had consumed 2,105 pounds more of grain than each steer in Lots 3 and 4. They have to their credit 22 pounds additional weight and a difference in value of 20 cents per hundred, or \$4.14 for 1,976 pounds of grain, which was largely corn meal fed during the summer. Had these long-fed cattle been disposed of November 1, when they came off grass, they would have paid a larger profit than the steers on pasture, but the subsequent feeding showed some profit on account of the high price per pound at which they were sold, as will be seen from the financial statement.

## FINANCIAL STATEMENT BY LOTS.

## Lot 1.

1901.

Nov. 30	To 6 steers, 6445 lbs., at \$5.40.....	\$348.03
	To 8334 lbs. of wheat at 66 cts. per bu. (\$1.10 per 100).....	91.67
	To 1224 lbs. of bran at 80 cts. per 100 lbs....	9.80
	To 736 lbs. corn at 56 cts. per bu. (\$1 per 100)	7.36
	To 736 lbs. oil meal at \$1.50 per 100.....	11.04
	To 5616 lbs. of alfalfa hay at \$8 per ton....	22.46
	To 792 lbs. of prairie hay at \$8 per ton.....	3.17
	To 584 lbs. of wheat straw at \$4 per ton.....	1.17
	To profit on 4 steers 23 weeks and on 2 steers 11 weeks.....	25.60
	To net profit on pigs with Lot 1.....	19.27

1902.

Feb. 7	By 2 steers, 2500 lbs.....	\$150.00
May 8	By 4 steers, 5390 lbs., at \$6.87 net.....	370.20
	By net profit on pigs with Lot 1.....	19.27
		<hr/>
		\$539.47    \$539.47

(Profit on each steer, \$8.97.)

## Lot 2.

1901

Nov. 30	To 5 steers, 5100 lbs., at \$5.40.....	\$275.40
	To 7520 lbs. of corn at 56 cts. per bu. (\$1 per 100).....	75.20
	To 1020 lbs. of bran at 80 cts. per 100.....	8.16
	To 736 lbs. of wheat at 66 cts. per bu. (\$1.10 per 100).....	8.10
	To 736 lbs. of oil meal at \$1.50 per 100 lbs..	11.04
	To 4914 lbs. of alfalfa hay at \$8 per ton.....	19.66
	To 792 lbs. of prairie hay at \$8 per ton.....	3.17
	To 584 lbs. of straw at \$4 per ton.....	1.17
	To profit on 4 steers 23 weeks and 1 steer 11 weeks.....	38.62
	To net profit on pigs with Lot 2.....	17.58

1902.

Feb. 7	By 1 steer, 1075 lbs. at \$6 per 100.....	\$64.50
May 8	By 4 steers, 5288 lbs. at \$6.87 per 100 net....	363.28
	By net profit on pigs with Lot 2.....	17.58
		<hr/>
		\$445.36    \$445.36

(Profit on each steer, \$11.30.)

*Lot 3.*

1901.

Nov. 30	To 5 steers, 4925 lbs. at \$4.20 .....	\$206.85
	To 9015 lbs. wheat at \$1.10 per 100.....	99.16
	To 1032 lbs. corn at \$1 per 100.....	10.32
	To 1049 lbs. bran at 80 cts. per 100.....	8.39
	To 1032 lbs oil meal at \$1.50 per 100.....	15.48
	To 4240 lbs. alfalfa hay at \$8 per ton.....	16.96
	To 990 lbs. prairie hay at \$8 per ton.....	3.96
	To 730 lbs. straw at \$4 per ton.....	1.46
	To profit on 5 steers, 23 weeks .....	82.17
	To net profit on pigs with Lot 3. ....	19.62

1902.

May 8	By 5 steers, 6668 lbs. at \$6.67 net.....	\$444.75.
	By net profit on pigs with Lot 3.....	19.62

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\$464.37    464.37..

(Profit on each steer, \$20.29.)

*Lot 4.*

1901.

Nov. 30	To 4 steers, 3900 lbs. at \$4.20 per 100 .....	\$163.80
	To 7115 lbs. of corn at \$1 per 100.....	72.15
	To 821 lbs. of wheat at \$1.10 per 100.....	9.03
	To 1049 lbs. of bran at 80 cts. per 100.....	8.39
	To 821 lbs. of oil meal at \$1.50 per 100.....	12.31
	To 4212 lbs. of alfalfa hay at \$8 per ton.....	16.85
	To 792 lbs. of prairie hay at \$8 per ton.....	3.17
	To 584 lbs. of straw at \$4 per ton.....	1.17
	To profit on 4 steers, 23 weeks.....	60.17
	To net profit on pigs with Lot 4. ....	15.70

1902.

May 8	By 4 steers, 5203 lbs., at \$6.67 net.....	\$347.04
	By net profit on pigs with Lot 4. ....	15.70

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\$362.74    \$362.74

(Profit on each steer, \$18.97.)

Profit on two long-fed lots.....	\$101.07
Profit on two short-fed lots.....	177.66

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Total profit on four lots.....    \$278.73

Neither the interest on investment nor risk has been charged in this statement.

## CONCLUSIONS.

1. The gains of Lot 1 on a wheat ration exceeded those of Lot 2 on a corn ration by 16 pounds per head in 23 weeks.

2. The gains of Lot 3 on a wheat ration exceeded those of Lot 4 on a corn ration by 22 pounds per head. This one experiment is not conclusive evidence that wheat exceeds corn in feeding value but indicates that the feeding value of wheat is 5 per cent greater than corn for cattle.

3. This experiment indicates that a 6-months' feeding period in this case is more profitable than a 12-months' feeding period.

4. This experiment shows a profit of \$10.14 per head on summer-fed yearling cattle compared with \$19.63 on cattle of the same quality which were on grass only during the summer. Taking the statement for the year, the cattle fed 12 months show a profit of \$15.49 against a profit of \$21.64 on the cattle fed grain during the winter only.

5. This experiment shows that hogs will make good gains following steers fed on ground feed.

#### EXPERIMENT IV.

#### COMPARISON OF SHELTER AND RATIONS IN FEEDING STEERS.

E. A. BURNETT.

In December, 1899, 18 steers were purchased at South Omaha for the Experiment Station to test the value of rations and of shelter for winter feeding. The three conditions imposed were as follows: Six steers were confined in open sheds 8x14 feet with a yard attached of the same size, making a stall and yard 8x28 feet, in which a single steer was confined. This shed opened on the east and was protected from southwest winds and partially protected from northeast winds.

Six steers were also confined in box stalls 8x12 feet, opening to the south. They had no exercise except when driven to the scales, and the privilege of a small yard while the stall was being cleaned daily. One steer was confined in each stall.

Six steers were also fed in an open yard 100x200 feet in dimensions, having an open shed 16x24 feet facing south, under which they could run at pleasure. They were also protected from the north by a shed 85 feet long and 10 feet high, a tight board fence 6 feet high along the remainder of the north side of the yard. These different yards and pens had been built the previous year with a view of determining the effect of exposure upon the gains of animals in the feed lot, and, though the number subjected to the experiment was too small to give definite results, the data secured is published.

It was not thought wise to complicate the experiment by too many different rations, and we therefore determined to use alfalfa hay for roughness and to use three different grain rations, viz., corn meal, corn meal and one-fourth oats, and corn meal and one-fourth bran, as the grain rations to test their relative values when fed with alfalfa hay. The results of the experiment indicate that more definite information on the value of shelter might have been secured had only one grain ration been used.

The lot of 18 weighed 14,870 pounds at the stock yards in Omaha, December 4, 1899, or an average of 826 pounds. They were probably yearling steers with possibly one exception.

These steers were fed alfalfa hay in an open yard until December 23, when they were separated into thirteen lots and put for one week upon a preliminary period of feeding, after which, on December 30, 1899, the experiment period began. During the period of 17 days in the open yard the steers consumed 3,068 pounds of alfalfa hay and 756 pounds of corn meal, and at the end of the preliminary period, the 12 steers in the stalls and pens—Lots 1 to 12 inclusive—received daily eight pounds each of grain and from 12 to 16 pounds each of alfalfa hay. Lot 13 in the open yard received daily per head only six pounds of corn meal and sixteen pounds of alfalfa hay. As the grain ration increased, the hay ration decreased, until—during the latter part of the feeding period—the various lots of steers received daily from 16 to 18 and, in one instance, 20 pounds of grain and from 5 to 10 pounds of alfalfa hay.

The correct average weight of the steers was difficult to determine, but an attempt was made to secure this weight by taking an average of three weights taken on three different days as the nearest estimate to the correct weight. This method was also followed in securing the last weights used in this experiment. The 18 steers were separated as follows:

	SHELTER.	RATION.	WEIGHT.
Lot 1	Open shed and pen.	Corn meal and alfalfa hay.	935 lbs.
Lot 2	Open shed and pen.	Corn meal and alfalfa hay.	915 lbs.
Lot 3	Open shed and pen.	Corn meal, oats, and alfalfa hay.	865 lbs.
Lot 4	Open shed and pen.	Corn meal, oats, and alfalfa hay.	900 lbs.
Lot 5	Open shed and pen.	Corn meal, bran, and alfalfa hay.	1085 lbs.
Lot 6	Open shed and pen.	Corn meal, bran, and alfalfa hay.	810 lbs.
Lot 7	Box stall in shed.	Corn meal and alfalfa hay.	805 lbs.
Lot 8	Box stall in shed.	Corn meal and alfalfa hay.	880 lbs.
Lot 9	Box stall in shed.	Corn meal, oats, and alfalfa hay.	915 lbs.
Lot 10	Box stall in shed.	Corn meal, oats, and alfalfa hay.	835 lbs.
Lot 11	Box stall in shed.	Corn meal, bran, and alfalfa hay.	920 lbs.
Lot 12	Box stall in shed.	Corn meal, bran, and alfalfa hay.	810 lbs.
Lot 13	Large yard and open shed.	(Six steers.) Corn meal and alfalfa hay.	5160 lbs.
	Average weight of Lots 1 to 6, inclusive (Dec. 30, 1899)		918 lbs.
	Average weight of Lots 7 to 12, inclusive (Dec. 30, 1899)		860 lbs.
	Average weight of Lot 13 (Dec. 30, 1899)		860 lbs.

TABLE VI.

(a) *Steers on corn meal and alfalfa.*

Time, 23 weeks.

Lot	No. in lot	Shelter	Grain	Hay	Last weight	First weight	Gains	Food consumed per lb. gain
1	1	Shed and yard. ....	2670	1332	1225	965	290	13.8
2	1	Shed and yard. ....	2365	1472	1235	950	315	12.18
7	1	Box stall. ....	2645	1480	1290	805	485	8.46
8	1	Box stall. ....	2652	1024	1335	880	455	8.08
13	6	Open yard and shed. ....	2626	1560	1166	860	314	13.3
		Average gain .....					372	.....

(b) *Steers on three-fourths corn, one-fourths oats and alfalfa.*

Time, 23 weeks.

Lot	No. in lot	Shelter	Grain	Hay	Last weight	First weight	Gains	Food consumed per lb. gain
3	1	Shed and yard. ....	2499	1446	1220	865	355	11.1
4	1	Shed and yard. ....	2583	1437	1220	900	320	12.5
9	1	Box stall. ....	2288	1126	1205	915	290	11.7
10	1	Box stall. ....	2392	1567	1180	835	345	11.5
		Average gain .....					327	.....

(c) *Steers on three-fourths corn, one-fourth bran and alfalfa.*

Time, 23 weeks.

Lot	No. in lot	Shelter	Grain	Hay	Last weight	First weight	Gains	Food consumed per lb. gain
5	1	Shed and yard. ....	2828	1531	1450	1085	365	11.9
6	1	Shed and yard. ....	2490	1430	1140	810	330	11.8
11	1	Box stall. ....	2409	1596	1345	940	405	9.9
12	1	Box stall. ....	2548	1591	1235	810	425	9.7
		Average gain .....					381	.....



## FINANCIAL STATEMENT.

		DR.	CR.
1899			
Dec. 5	To 18 steers, 14,870, at \$4.66.....	\$691.45	
	To freight Omaha to Lincoln.....	14.00	
	To preliminary feeding—		
	5,000 pounds of alfalfa at \$4 per ton....	10.00	
	1472 pounds of corn at 44 cts. per 100....	5.47	
	66 pounds of bran at 60 cts. per 100....	.40	
	66 pounds of oats at 60 cts. per 100.....	.40	
Dec. 30	To 13 tons of hay during experiment at \$4 .	52.00	
	To 39170 pounds of corn at 44 cts. ....	172.35	
	To 2890 pounds of oats at 60 cts. ....	17.34	
	To 3062 pounds of bran at 60 cts. ....	18.37	
	To feeding from close of experiment to selling—		
	3087 pounds of corn at 44 cts. ....	13.58	
	1550 pounds of corn at 60 cts. ....	9.30	
	1550 pounds of bran at 60 cts. ....	9.30	
	4000 pounds of alfalfa at \$4 per ton.....	8.00	
	To interest on \$1,000 for six months. ....	40.00	
July 2	To freight to Omaha.....	18.70	
	To internal revenue.....	.11	
	To yardage, 25 cts. per head. ....	4.50	
	To hay. ....	.40	
	To commission, 50c per head. ....	9.00	
	To balance (profit). ....	3.16	
July 2	By 18 steers, 21330 lbs. at \$5.10. ....		\$1,087.83
		<u>\$1,087.83</u>	<u>\$1,087.83</u>

## CONCLUSIONS.

In these feeding operations, as in all feeding, the large gains proved to be the cheapest gains, and these were not made by any one ration. All the extremely large gains were made by steers in the box stalls in the shed. Four of the six steers in the shed made an average gain of 444 pounds each, whereas the average gain of the 18 steers was only 350 pounds. It was also true that the poorest gain made by any one of the 18 steers was made in a box stall in this shed by No. 9, but it is probable that this was due to the peculiarities of the steer rather than to the surroundings. He was never a good feeder as he consumed from 100 to 400 pounds less grain than the other steers, and was one of the heaviest steers outside of No. 5 when they were put into the experiment. At this time he weighed 915 pounds, while the six in this shed averaged only 860 pounds.

The average gains of the lots of six steers according to the shelter was as follows:

Six open-shed-and-pen steers made 330 pounds average gain.

Six box-stall steers made 400 pounds average gain.

Six open-shed-and-yard steers made 315 pounds average gain.

The average gain by lots on the same kind of feed and under the same condition is given in Table IV, but if we average all lots on one kind of feed, but under different conditions, we find the following results:

Ten steers on corn meal and alfalfa hay made 344 pounds average gain.

Four steers on corn meal and oats and alfalfa hay made 344 pounds average gain.

Four steers on corn meal and bran and alfalfa hay made 381 pounds average gain.

In this experiment corn meal and alfalfa in the box stall gave the largest gain. Corn meal, bran and alfalfa in the box stall gave the second largest gain. Corn meal, bran and alfalfa in the open shed and pen gave the third largest gain.

#### EXPERIMENT V.

#### RAISING CALVES FOR BEEF PRODUCTION—SKIM-MILK VS. SUCKING DAM.

E. A. BURNETT.

In the spring of 1899 the Department of Dairy Husbandry at the Station undertook an experiment to determine the relative profit of milking beef-bred cows and feeding the calves from these cows on separator skim-milk and a grain ration, compared with allowing the calf to run with its mother until weaning time. Six calves were used in that experiment, the results of which are reported in Bulletin No. 68. All these calves were well-bred grade Herefords except Lot 2, which steer was one-half Jersey with considerable Shorthorn blood, but was a good blocky steer of moderate quality.

The calves that sucked the cows in this experiment were weaned December 1, 1899, and on December 9 they were transferred to the Department of Animal Husbandry to be fed for the purpose of determining what effect their previous treatment would have on their value for beef production.

On December 9, 1899, these calves were divided as follows: The skim-milk calves were numbered Lots 1, 2, 3. The calves that had run with their dams were numbered Lots 4, 5, 6. They weighed as follows:

Lot 1, 435 pounds; Lot 2, 415 pounds; Lot 3, 380 pounds; average of the three lots fed, 410 pounds; average age, 190 days.

Lot 4, 390 pounds; Lot 5, 360 pounds; Lot 6, 380 pounds; average of the three lots sucking cows, 377 pounds; average age, 191 days.

These calves were carried forward for the next 16 months in three periods, as follows:

Period I, from December 9, 1899, to May 5, 1900, 147 days, during which time they were fed on alfalfa hay and a grain ration three-fourths corn and one-fourth bran.

Period II, from May 5, 1900, to November 3, 1900, 182 days, during which they were on pasture and received a grain ration of eight pounds each per day, consisting of one-half corn, one-quarter oats and one-quarter bran.

Period III, from November 3, 1900, to April 27, 1901, 147 days, during which time five animals only were fed, the ration consisting of one-half corn, one-quarter oats, and one-quarter bran, with alfalfa hay and roots.

Lot 6, a heifer, was withdrawn from the experiment after the second period. As she made average gains during the first two periods, there is no reason to think that from this experiment the calves running with their dams are better for beef production than calves fed under the best known methods on sweet separator milk and a grain ration to replace the fat and solids which are taken from the milk in skimming. It will be noted from the first weights that the calves that had been fed were heavier for their age at weaning time than those that ran with the cows and had pasture with no grain. Some difference in quality was visible, even at the end of the first winter, in favor of the calves that had sucked their dams, but this could not be detected after they had been on grass, and was not apparent at selling time.

TABLE VII.—*Skim-milk vs. sucking dams.*

PERIOD I.—December 9, 1899, to May 5, 1900.

Lot	Period	Grain	Hay	Last weight	First weight	Gain	Food consumed for 1 lb. of gain
1	147 days	906	793	730	435	295	.....
2	147 days	888	786	675	415	260	.....
3	147 days	902	796	700	380	320	.....
4	147 days	894	786	750	390	360	.....
5	147 days	894	786	710	360	350	.....
6	147 days	894	786	700	380	320	.....
Total	.....	5378	4733	4265	2360	1905	.....
Average	.....	896	789	.....	.....	.....	5.30
Average gain on fed calves (Lots 1-2-3)						292	.....
Average gain on sucking calves (Lots 4-5-6)						343	.....

PERIOD II.—May 5, 1900, to November 3, 1900.

Lot	Time	Grain	Pasture	Last weight	First weight	Gain
1	147 days	1417	147 days	1000	730	270
2	147 days	1417	147 days	910	675	235
3	147 days	1417	147 days	1035	700	335
4	147 days	1417	147 days	1000	750	250
5	147 days	1417	147 days	985	710	275
6	147 days	1417	147 days	925	700	225

## PERIOD III.—November 3, 1900, to April 27, 1901.

Lot	Time	Grain	Hay	Roots	Last weight	First weight	Gain
1	147 days	2617	1471	455	1325	1000	325
2	147 days	2628	1471	455	1245	910	335
3	147 days	2694	1579	525	1370	1035	335
4	147 days	2530	1471	455	1335	1000	335
5	147 days	2575	1538	1015	1320	985	335
Average gain on lots 1, 2 and 3 .....							332
Average gain on lots 4 and 5 .....							335

Average gain of Lots 1, 2 and 3, from December 9, 1899, to April 27, 1901, 903 pounds. Average gain of Lots 4 and 5 for the same period, 903 pounds.

## RECORDS OF CURLY AND JOHN.

Two steers of this lot, viz., No. 3, "John," from the skim-milk lot, and No. 5, "Curly," from the lot that sucked the dam, were retained and their records carried forward for a period of seven months, closing the records on November 23, 1901, when these steers were sent to the International Live Stock Exposition at Chicago where they were entered in the class of Grades and Crossbreds over two years.

In the last feeding period, John, which was the coarser and growthier steer, made the larger gain and also a somewhat cheaper gain than Curly, owing to the fact that he was not ripe and thoroughly matured.

In the show John was unplaced, but was afterward sold to Armour & Co. at \$7.65, bringing \$132.35.

Curly was a steer of most excellent type. The *Breeder's Gazette* said: "He was a grand good steer, thicker and riper than Garcia (the steer which won first prize), not quite so well filled in his quarters, but a steer that indicated more quality in his flesh." Curly was given second place against forty competitors.

Curly also took second prize in the class for Grades and Crosses in the Agricultural College Competition with eleven competitors, winning over Garcia by whom he was beaten the day before, but losing to St. Hubert, which stood fourth in the competition of the previous day.

Curly also won first prize in the Hereford Special, Two-year-old Grades and Crosses.

On the block he compared favorably with some of the champion steers of the show as indicated in the following table taken from the *Nebraska Farmer*.

TABLE VIII.—*Curly and the Hereford Champions dressed.*

	Live weight	Dressed weight	Per cent dressed	Per cent fat	Per cent hide
The Woods Principal, Hereford, owned by Geo. P. Hendry, Goodenow, Ill. ....	1645	1102	66.99	5.78	6.20
Uncle John 2d, Hereford, owned by Geo. S. Redhead, Des Moines, Ia. ....	1520	960	63.16	5.99	6.91
Beau Lou, Hereford, owned by Mackin Bros., Lee's Summit, Mo. ....	1350	864	64.00	6.89	6.67
Curly, Hereford grade, owned by Nebraska Experiment Station. ....	1645	1107	67.30	8.21	6.08

For the purpose of comparing the feeding records of these steers from birth to time of slaughter, the records are given below.

 TABLE IX.—*John, calved July 8, 1899.*

Period	Days	Time	Whole milk, lbs.	Skim-milk, lbs.	Ground flaxseed, lbs.	Corn, lbs.	Oats, lbs.	Days pasture	Hay, lbs.	Last weight	First weight	Gain	Food consumed per lb. gain
1	154	July 8 to Dec. 8, 1899	200	2212	12	93	93	58	136	380	102	278	1.96
Period	Days	Time	Corn	Oats	Bran	Oil meal	Total grain	Alfalfa hay	Roots	Last weight	First weight	Gain	Food consumed per lb. gain
2	147	Dec. 9 to May 4. . . .	651	....	216	....	867	787	....	700	380	320	5.16
3	182	May 5 to Nov. 5. . . .	707	355	355	....	1417	18	....	1035	700	335	4.28
4	176	Nov. 3 to April 27. . .	1912	670	99	....	2681	1523	485	1370	1035	335	12.69
5	210	Apr. 28 to Nov. 23, 1901	1993	687	538	321	3539	507	....	1715	1370	345	13.17
	869	Total. . . . .	5263	1712	1208	321	8504	3335	485	1717	135	1580	....

*Curly, calved June 16, 1899.*

1	176	June 16 to Dec. 8, 1899.	Sucking cow.							360	85	275	.....
2	147	Dec. 9 to May 4. . . .	679	.....	226	.....	905	787	.....	710	360	350	4.83
3	182	May 5 to Nov. 2. . . .	709	355	355	.....	1419	18	.....	985	710	275	5.22
4	176	Nov. 3 to April 27. . .	1287	644	644	.....	2575	1538	1015	1320	985	335	12.87
5	210	April 28 to Nov. 23, 1901. . . . .	1665	774	715	311	3465	567	.....	1645	1320	325	13.94
	891	Total. . . . .	4340	1773	1940	311	8364	3410	1015	1645	85	1560	.....

Curly was bred and raised on the Station farm and was out of a grade Hereford cow purchased on the range in Central Nebraska. He was sired by the Hereford bull Legal Tender 61224 by Earl of Shadeland 22d.

The calf, Curly, was grown on the Station farm without any idea of his being shown in competition. He came into the Department when he was about six months old and was fed during the first winter on alfalfa hay with a grain ration three-quarters corn and one-quarter bran. On May 5, 1900, he was turned on pasture, where he remained until November 2. Again on April 28, 1901, he was placed on pasture, where he remained until

about August 1. Beginning on May 4, 1900, the grain ration of this steer was made up of one-half corn, one-quarter oats and one-quarter bran. The character of this grain ration was not changed from that time until about August 1, 1901, a period of about fifteen months. After August 1, 1901, he received a small ration of oil meal, and during the months of October and November, 1901, he received a ration of 50 per cent corn, 20 per cent oats, 15 per cent bran, and 15 per cent oil meal. During the winter of 1900-1901 he received alfalfa hay for roughness and about ten pounds of mangels per day for a period of nearly five months. This steer was never limited in his supply of roughness, and during the last six months of his feeding it was necessary to guard against over-ripeness, as will be indicated by the rather small consumption of grain between April 28 and November 23, 1901. He was fed twice daily until about the first of October, after which time he received both grain and hay three times a day.

It is interesting to note that this steer, during the last two years of his life, required 6.6 pounds of grain to produce one pound of gain and less than ten pounds of total food to produce a pound of gain, not counting the food secured during 358 days on pasture. This record would tend to show that finished cattle can be economically produced if they are so fed that they continue to make good gains up to the time when they are finished. The killing records show that this steer dressed 67.3 per cent, giving a dressed weight of 1,107 pounds from a live weight of 1,645 pounds, with only 8.21 per cent tallow and 6.08 per cent hide. The rather heavy hide was due to an exceedingly heavy coat of hair and not to extreme thickness of the skin.

This steer is a conspicuous example of the effect of good blood in improving the common cattle of the country. He was a low-down, blocky, thick-fleshed type, which are noted as being good feeders, and was a worthy scion of his illustrious grandsire, Earl of Shadeland 22d. He demonstrated the fact that steers of the right type are rent payers, and that profit lies in continuous growth.

#### EXPERIMENT VI.

##### WINTERING CALVES ON ROUGHNESS.

E. A. BURNETT.

H. R. SMITH.

In January, 1902, a lot of twelve Aberdeen-Angus calves was purchased for the purpose of determining how such stock could be most cheaply wintered and still be brought to grass in good condition to go on and make summer gains. These calves were divided into two lots of six each.

Lots 1 and 2 were placed under test on January 18, 1902, after two weeks of preliminary feeding.

Lot 1, six steers, weighed 2,950 pounds. They received a ration of alfalfa hay and prairie hay with no grain.

Lot 2, six calves, weighed 2,885 pounds. They received the same roughness as lot 1, but in addition received a ration of four pounds of grain per day.

The experiment continued until April 20, a period of thirteen weeks, when these steers were turned together upon pasture in the same field.

TABLE X.—*Grain vs. no grain in wintering calves.*

Lot	No in lot	Time	Alfalfa hay	Prairie hay	Grain	Average last weight	Average first weight	Average gain
1	6	91 days	Lbs. 1237	Lbs. 250	Lbs. none	592	492	100
2	6	91 days	1050	243	350	666	481	185

Lot 1 required 14.87 pounds of hay for each pound of gain but made a gain of 1.1 pounds in weight daily on hay alone.

Lot 2 required 8.90 pounds of food to make one pound of gain in weight.

Figuring hay at \$8 per ton, the gains on Lot 1 cost \$6 per hundred, while the gains on Lot 2 cost only \$4.66 per hundred.

The experiment shows that it is ordinarily more economical to feed a small grain ration even when good gains can be secured on hay alone.

The character of the roughness should be noted, as the too prevalent habit of wintering calves without grain generally results in their coming through the winter in bad condition and without having gained in weight. From the facts at hand, this does not seem necessary when good alfalfa and prairie hay are available. A mixture of alfalfa and prairie hay was thought to be preferable to alfalfa alone, as it prevented scouring, which often resulted when prairie hay was not fed regularly. The proportion in which this hay was fed, namely, 80 per cent alfalfa and 20 per cent prairie hay, seemed to prevent nearly all scouring and to represent about the proportion desired by the animals of the quality of hay being fed.

October 30, 1902, these steers were weighed again, to determine the summer gains. Those in Lot 1 weighed 880 pounds each and those in Lot 2, 900 pounds each. Those that had no grain during the winter had therefore gained 288 pounds since April 20, or a period of 192 days, while those in Lot 2 had gained only 234 pounds in that time.

Although the steers in Lot 1 were only 20 pounds lighter October 30, there was yet a noticeable difference in quality. Mr. Noe, with Clay, Robinson & Co., South Omaha, estimated Lot 1 at \$4.75 per hundred and Lot 2 at \$5. At these figures the steers in Lot 1 are worth \$41.80 and those in Lot 2, \$45 each. With pasture at \$3 per acre, charging each the same rate, we find that the steers in Lot 1 make a net profit of \$4.74 and those in Lot 2 \$5.73 each from April 20 to October 30, 1902. The steers of both lots will be fed through the winter, so the final results will be known in a few months hence.

The same experiment will be repeated with a larger number of calves the coming winter.



## EXPERIMENT VII.

## WHEAT COMPARED WITH OTHER GRAINS FOR PIGS.

H. R. SMITH.

Forty-eight pigs were divided into eight lots, each lot consisting of the so-called bacon pigs, Tamworth and Yorkshire, and two of the block type, Duroc-Jersey and Berkshire. While the pigs were not prime feeders, they were divided in such a way as to make the lots fairly even in quality and weight. The experiment was carried on in a closed shed where each lot had the run of a small pen 8x12 feet and small yard adjacent 8x16 feet. All pens had cement floors, which proved unsatisfactory during the severely cold weather. The only way by which the pigs could be kept at all comfortable was by keeping them heavily bedded with straw so they would not come in close contact with the cold cement.

Previous to the experiment, all lots had the same ration, consisting of corn, shorts and wheat. Each lot was put upon its experimental ration nine days previous to the first weighing so that all should become accustomed to the new rations. The experiment was begun October 1, 1901, and closed January 20, 1902. Table XI shows the feed record, gains and profits by lots, and Table XII the average for each pig by lot.



TABLE XI.—*Wheat compared with other grains for pigs.*

Thirteen weeks from October 21, 1901, to January 20, 1902.\*

Lots	Weight at close	Weight at beginning	Gain		Cost of grain consumed heat, 100 per cent. \$55.00 per ton. bu.; shorts, \$18 per ton	First cost of pigs at \$4.50 per 100	Total cost of pigs when sold	Price received for pigs at \$5.52½ per 100	Profit on each lot
	lbs.	lbs.	lbs.	lbs.					
Lot 1, 6 pigs, whole wheat, dry.....	1004	662	342	2178	\$19.96	\$29.79	\$49.75	\$55.47	\$5.72
Lot 2, 6 pigs, whole wheat, soaked 18-24 hours.....	1046	661	385	2210	20.24	29.74	49.98	57.79	7.81
Lot 3, 6 pigs, ground wheat	1062	648	414	2317	23.08	29.16	52.24	58.67	6.43
Lot 4, 6 pigs, ground wheat and corn, equal parts . . .	1069	668	401	2351	23.97	29.06	53.03	59.06	6.03
Lot 5, 6 pigs, ground wheat and rye, equal parts . . .	1024	641	383	237	23.39	28.84	52.23	56.57	4.34
Lot 6, 6 pigs, ground wheat and shorts, equal parts. . .	1044	656	388	2375	22.51	29.52	52.03	57.68	5.65
Lot 7, 6 pigs, ground corn. . .	1047	660	387	2356	24.54	29.70	54.24	57.84	3.60
Lot 8, 6 pigs, ground rye . . .	1006	639	367	2290	22.28	28.75	51.03	55.58	4.55
Total profit on forty-eight pigs during the thirteen weeks' feeding.....									\$44.13

TABLE XII.—*Wheat compared with other grains for pigs.*

	Averages for one pig					
	Weight at close, Jan- uary 20	Weight at beginning, October 2	Gain	Daily gain	Amount of feed con- sumed	Am't of feed consumed for 1 lb. of gain
	Lbs.	Lbs.	Lbs.	Lbs.		
Lot 1, whole wheat, dry.....	167	110	57	.63	363	6.37
Lot 2, whole wheat, soaked.....	174	110	64	.70	368	5.75
Lot 3, ground wheat.....	177	108	69	.76	386.1	5.59
Lot 4, ground wheat and corn.....	178	111	67	.74	392	5.86
Lot 5, ground wheat and rye.....	170.7	107	63.7	.70	396	6.21
Lot 6, ground wheat and shorts.....	174	109	65	.71	396	6.12
Lot 7, ground corn.....	174.5	110	64.5	.71	393	6.09
Lot 8, ground rye.....	168	107	61	.67	381	6.24

## NOTES ON THE EXPERIMENT.

All ground feed was mixed to a slop thick in the trough after weighings were made.

The wheat for Lot 2 was weighed, then placed in pails of water, where it soaked from 18 to 24 hours before being fed.

The whole wheat for Lot 1 was placed in a flat trough. The pigs were rather slow in consuming the dry wheat because of difficulty in mastication. Many kernels passed through undigested.

One pig in Lot 5 on wheat and rye was off feed for several days, which put that lot at a disadvantage.

All were occasionally fed charcoal and lime, which was greedily consumed and seemed to whet the appetite.

In reckoning the profits of Lots 3, 4, 5, 6, 7 and 8, eight cents per hundred pounds was charged for grinding wheat and rye, and six cents per hundred for corn. These are the rates charged in this locality.

The pigs were sold on the farm at \$5.52½ per hundred.

Two bacon pigs, one fattened on corn and the other on wheat, and two of the block type, in this case Duroc-Jersey, one fattened on corn and the other on wheat, were slaughtered on the farm.

Little difference was observed between carcasses of wheat-fed and carcasses of corn-fed hogs except that perhaps a little more lean meat was noticeable on the wheat hogs.

The larger proportion of lean meat on the bacon hogs was very apparent.

The tables show—

(1) The most economical gains were made by Lot 2, on soaked wheat.

(2) The largest gains per pound of food consumed were made by Lot 3, on ground wheat, but the gain of this lot over Lot 2 is more than offset by cost of grinding.

The smallest profit was made by Lot 7, on corn alone. (See Table XI.) This is partly due to the fact that corn at this time was the highest-priced feed used in the experiment. However, the column in Table 2 showing food consumed per pound of gain puts ground corn at a feeding value 9 per cent below wheat, pound for pound.

Ground rye is shown to be 2 per cent below corn for feeding purposes but the cost per bushel in this case, 50 cts. for rye and 55 cts. for corn, puts the rye ahead in the net profits.

In drawing general conclusions from this experiment, attention should be given to the amount of food required to produce one pound of gain as well as the column showing net profits, since the relative prices on these grains vary materially from time to time.

## CONCLUSIONS.

Two important conclusions can be drawn from this experiment,—

(1) Wheat can be profitably substituted for corn in feeding pigs so long as the price of wheat is not more than nine per cent higher than corn.

(2) In feeding wheat to hogs it should first be soaked or ground. Of

the two, soaking is more economical, unless grinding can be done for about two cents per hundred pounds.

EXPERIMENT VIII.

CORN VS. WHEAT FOR PIGS ON ALFALFA PASTURE.

E. A. BURNETT. H. R. SMITH.

May 8, 1902, 18 pigs were placed in three quarter-acre lots of alfalfa. The pigs were divided so that each lot contained six pigs approximately even in quality and weight. These pigs were a mixed lot of Tamworth and Duroc crossbreds and had previously run behind experimental steers where they subsisted on ground wheat and corn droppings, one pig to each steer, with one pound of shorts additional.

Lot 1 was given a ration of ground corn; Lot 2, 95 per cent ground corn and 5 per cent dried blood; and Lot 3, ground wheat. Each lot was given freely of alfalfa pasture and all were on rape one week.

The following table shows the average gains and cost per hundred pounds of gain.

TABLE XIII.—*Wheat vs. corn for pigs on alfalfa pasture.*

	Av. weight at close, July 16	Av. weight at beginning, May 14, '02	Av. gain during the six weeks	Av. gain per day	Food consumed by each	Food consumed for 1 lb. gain	Cost of food per 100 lbs. gain	Av. profit not counting pasture and labor
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		
Lot 1, corn. ....	223	146	77	1.22	308	4.00	\$4.00	\$3.77
Lot 2, { corn 95%..... dried blood 5% }	227	145	82	1.30	308	3.76	4.04	3.88
Lot 3, wheat .....	229	147	82	1.30	308	4.04	4.13	3.83

In determining the cost of food per 100 pounds of gain corn was valued at \$1.00 per cwt., wheat at \$1.10, and dried blood at that time was quoted at \$2.50 per cwt.

From the table it will be noted that the gains on corn with alfalfa were smallest, the wheat ration and the ration consisting of 5 per cent mixture of dried blood and corn giving the same gains. Figuring these products at market values it will be seen that the cost of 100 pounds of gain on corn and alfalfa was slightly below corn and dried blood, and thirteen cents per hundred below wheat.

Had the wheat been purchased at \$1.06 per cwt. and the dried blood at \$2.26 per cwt., the cost of 100 pounds of gain made by Lots 2 and 3 would have been the same as in Lot 1 on corn at \$1.00 per cwt.

While the cost of 100 pounds gain on corn and alfalfa was lowest it will be noted that the net profits on both Lot II and Lot III were greater than Lot I on corn. This seeming inconsistency is explained by the fact that the gains on wheat and also on dried blood and corn were much greater than

on corn. This extra gain with an advance in price of \$1.00 per 100 lbs. accounts for the greater profits on Lots II and III.

The addition of five per cent dried blood to corn makes a ration containing the same amount of digestible protein and the same nutritive ratio as the ration of wheat. It is significant that the gains on these two lots were the same.

## ALFALFA ONE OF NEBRASKA'S LEADING CROPS.

(From "Nebraska's Resources Illustrated," a condensed history of Nebraska for fifty years to date, published by Nebraska Farmer.)

Nebraska is the most extensive and successful alfalfa-producing district in the United States. In no other area of fifty millions of acres is alfalfa so universally grown and so abundantly productive in seed, hay and pasture as is now shown in Nebraska.

Twenty years ago Nebraska commenced the introduction of alfalfa by experiments and tests in a small way to determine its adaptability to the soil and climate. Its success, under these conditions, was such as to give encouragement, and little by little the acreage increased until its feeding value became a matter of scientific investigation. Within the past eight years a general sentiment has been created in favor of increased acreage, and especially within the past five years has there been a widespread disposition to turn the hay crop of the farm and ranch to alfalfa as rapidly as conditions will permit. In no other state do alfalfa ranches extend into thousands of acres, and this without the encouragement of a single acre of these large tracts being under irrigation. Natural conditions of moisture have been sufficiently successful in alfalfa culture in Nebraska to encourage hundreds of quarter-section and half-section tracts to be put to alfalfa growing as a feed and hay crop.

The practical features of alfalfa have been determined in its value as a swine pasture and hay crop. So pronounced have been the results that hog raising and feeding without the aid of the alfalfa pasture are regarded as impracticable and lacking in business judgment among intelligent Nebraska stockmen. The same sentiment is rapidly finding indorsement with the feeders of the hay-eating animals, and the disposition to grow sufficient alfalfa to accommodate the hay demand on the farm and in the feed yard is being expressed by increased acreage where needed.

The commercial feature of the alfalfa crop has not received the encouragement anticipated by those who planned selling the hay on the open markets of the country. Its value as a growing and fattening feed for the meat-producing animal is unquestioned, but as a feed for the hard worked city teams, there has been nothing in the form of hay that has been able to displace the native prairie hay of Nebraska. As a feed for the dairy cow, alfalfa stands at the top of the list, and no attempt has been made to displace it. As a profitable crop in the matter of liberal crop yield, it has no competitor among the grasses and clovers, and none in forage crops, unless, perhaps, the sorghum plant be introduced, and this is unevenly classed and

a poor competitor, as the alfalfa needs no reseeding and is a pasture of considerable value after the hay is harvested.

Every acre of alfalfa, up to the limit of the stock-carrying capacity of the farm, is worth \$75 as a land investment of farm resource in the live stock operations of the land owner, but there is a limit to profitable alfalfa production on the farm. Yet great opportunity for profit is afforded on the majority of farms through alfalfa culture alone. Every farm should have its proper proportion of alfalfa acreage in order that the most economical feed system be carried on in the management of its feeding interests.

Alfalfa is now successfully grown in every county in Nebraska. On the west side of the state where semi-arid conditions exists, there the most successful crops of both hay and seed have been produced. Moist conditions, and where much rainfall prevails during the late summer and autumn season, are the greatest difficulties encountered in growing and handling the crop successfully. The one great need now in alfalfa culture is a cheap and convenient cover for the hay, which under present conditions is stacked open to the weather and subject to serious loss from water soaking.

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## NEBRASKA A STATE OF UNEQUALED RESOURCES.

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(From "Nebraska's Resources Illustrated," a condensed history of Nebraska for fifty years to date, published by Nebraska Farmer.)

Nebraska is the **THIRD** state in the production of corn.

Nebraska is the **FOURTH** state in the production of wheat.

Nebraska is the **FIFTH** state in the production of oats.

Nebraska is the **FIFTH** state in the production of beet sugar.

Nebraska is the **FOURTH** state in the production of cattle.

Nebraska is the **FOURTH** state in the production of hogs.

Nebraska is the **EIGHTH** state in the production of horses.

Nebraska produces more vine seeds and sugar corn for seed purposes than all the balance of the United States combined.

Nebraska has the greatest number of distinct varieties of native pasture and hay grasses of any state in the United States.

Nebraska's native grass pastures on the west and northwest half of the state will produce more pounds of beef to the steer, during the grazing season, than can be produced on pasture in any other district of country on the continent.

Nebraska has the largest acreage of wild grass hay lands of any state in the Union, and when hundreds of thousands of acres now remote from railroad and used for grazing are turned to hay producing, she will stand **FIRST** as a hay-growing state.

Nebraska has in one body on the east side of the state, 20,000,000 acres of land of higher agricultural quality and now producing more value in farm crops than any other tract of land of equal area in the United States.

Nebraska has in one body, on the west side of the state, 29,000,000 acres

of grazing and hay lands that cannot be surpassed as a live stock grazing district by any equal area in the United States.

Nebraska produces the finest feeding cattle in the world, which has been abundantly set forth in the "Grand Champion Prize Steer of America," the blue-roan Challenger, who so easily won over all competitors at the International Fat Stock Show and Exposition at Chicago in 1903, and the additional evidence of the Grand Champion carload lots of steers exhibited by the Nebraska Land and Feeding Company that found no equals in the show ring at the American Royal at Kansas City in 1903, and the same was true of their exhibit at the International at Chicago in 1902.

Nebraska is increasing more rapidly in every line of agricultural development, live stock improvement, feeding of live stock, grain production, fruit growing, forestry, etc., than any other state.

THE DISTRIBUTION  
OF THE  
NATIVE FOREST TREES  
OF NEBRASKA

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BY CHARLES E. BESSEY





## THE DISTRIBUTION OF THE NATIVE FOREST TREES OF NEBRASKA.

BY CHARLES E. BESSEY.

For nearly twenty years I have been collecting data as to the distribution of the native forest trees of Nebraska, and have made preliminary publications of such results as were reached from time to time.\* In each successive list some additions were made and corrections entered, so that at the present time we are able to indicate with a good deal of accuracy the species and their distribution throughout the state. We know also the origin of all our species, and much as to the past and present movements of the trees and the forest areas which they make. With regard to these matters sufficient publication has already been made. In the present paper some corrections in names have been made, and for the first time maps are used to show their distribution. These were first drawn in 1892 for my own use in the study of the movements of the different species, and then copied for use in the forestry exhibit in the Columbian Exposition in 1893. They are now published with such corrections as I have been able to make through continued personal observation, and the aid which I have received from accommodating correspondents. It is hoped that their publication will stimulate to still further corrections, and I shall be greatly obliged for any additions or suggestions from anyone who has facts which do not appear in this report as a whole. It should be said that the maps are drawn in bold outlines, and no attempt is made to indicate little details. It is not intended to indicate that a particular tree is found everywhere within the area assigned to it on the map. If however, any species is known to occur a considerable distance outside of the areas marked on the map the fact should be communicated to me at once. Wherever possible, specimens of the leaves or fruits should be secured and sent to me, along with the information. Address all communications to me at The University of Nebraska, Lincoln Nebraska.

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\*Report read at Summer Meeting of the Nebraska State Horticultural Society, August, 1891.

Trees and Shrubs of Nebraska, in *Nebraska Farmer*, November, 1891.

Preliminary Report on the Native Trees and Shrubs of Nebraska, in Bulletin 18, Nebraska Agricultural Experiment Station, 1902.

A Second Report upon the Native trees and Shrubs of Nebraska, in Annual Report of the Nebraska State Horticultural Society, 1892.

A Third Report upon the Native Trees and Shrubs of Nebraska, in Annual Report of the Nebraska State Board of Agriculture, 1893.

The Nomenclature of the Nebraska Forest Trees, in publications of the Nebraska Academy of Sciences, 1898.

The Forests and Forest Trees of Nebraska, in Annual Report of the Nebraska State Board of Agriculture. 1899.

## 1. ROCK PINE.

*Pinus scopulorum* (Engelmann) Lemmon, Garden and Forest, 10 (1897).—

In former reports this has been called "Bull Pine," and the species has been given as *P. ponderosa*, but I am now convinced that it is better to regard it as a separate, but closely allied species. The two trees differ in size of tree, cones, and length and number of leaves, the Rock Pine being smaller, having smaller cones, with leaves in twos, and shorter than in the true Bull Pine. This tree forms dense forests in the northwestern and northern portions of the state, extending from the Wyoming line along Pine Ridge and the Niobrara river to the eastern boundary of Rock and Keya Paha counties. It occurs also on the North Platte river as far east as Deuel county, and also south of that river on the Wild Cat mountains, and the outlying hills. It is so abundant in this latter region that saw mills have been erected, and much lumber manufactured from it. It is said to occur, also, in isolated patches on the high rough land between the North Platte river and Pine Ridge. I have myself not seen the pine in this latter locality, but it is so reported by government surveyors. It occurs in limited areas in the Loup valley in the eastern edge of the Sand Hills, and also in Greeley and Custer counties. It formerly occurred along the Platte river eighteen or twenty miles east of the junction of the North and South Platte rivers, as is shown by fragments of roots dug from the ground. Similarly, it formerly occurred in Franklin county in the Republican valley, where it seems now to be extinct. This tree has acquired new interest within the last few years from the fact that it has been found to be an excellent one for planting in the Sand Hills of central Nebraska, where extensive plantations have already been made. Its seeds germinate readily, and the young trees are hardy and easily transplanted. In the parts of the state where the trees grow naturally, seeds are formed abundantly, and in many places where fires and cattle are kept out the seedlings are very numerous and thrifty. Even in the far western portions of the state it is not at all an uncommon thing to find an old tree surrounded by a colony of young trees which have sprung up from the seeds scattered by the wind on the prairie sod. The lumber made from this tree is of fair quality and resembles somewhat that of the Hard Pine of the South, but with a coarser grain and a little more tendency to warp. It makes good "dimension lumber," and is considerably used for this purpose in the western and northwestern portions of the state.

## 2. EASTERN RED CEDAR.

*Juniperus virginiana* L. Sp. Pl. 1039 (1753).—Eastern Nebraska along the streams and occasionally scattered over the hills in central Nebraska,

and possibly to the western border. This Red Cedar does not occur in dense growths any place in the state. This valuable tree has been extensively planted in eastern Nebraska, and there is no doubt as to its hardiness and usefulness. The wood is perhaps the most durable of all that grow naturally in the state, and it makes fence posts that are almost indestructible. It has one great drawback, and that is its susceptibility to a fungous disease, the "Cedar Apple" which disfigures it, and what is still worse, infects the neighboring apple trees, causing them to be affected with a serious "rust" of the leaves. So serious a disease has the apple rust become in some parts of the state that orchardists have taken to cutting out their Red Cedars in order to avoid the infection. Red Cedars should not be planted in close proximity to apple orchards.

### 3. WESTERN RED CEDAR.

*Juniperus scopulorum* Sargent, Garden and Forest, 10 (1897).—This species has been so much confused with the foregoing that it is quite difficult to assign its range with accuracy. All the Red Cedars in the state were until recently supposed to be of one species, namely, the first mentioned, but Professor Sargent has determined that in western Nebraska, many, if not all, of the trees belong to the western species. In assigning its range, I should give it as the western counties of Nebraska extending eastward along the Platte and the Niobrara rivers for a hundred miles or more. What is said above as to the value of the Red Cedar, applies equally well to the western species. I do not know whether this species is as subject to the disease ("Cedar Apple") as the eastern species, but incline to the belief that in this respect the western form is superior to the other. It is a prettier, more glaucous tree, and it may be distinguished by the fact that it forms larger "berries" than the common Red Cedar, and they do not ripen until the second year. The "berries" of the Red Cedar of the eastern part of the state ripen the first season. The western Red Cedar is to one which has been called "Platte Cedar" and "Silver Cedar" by the Nebraska horticulturists. It occurs in the mountains westward in Wyoming and Colorado.

### 4. PAPAWE.

*Asimina triloba* (L.) Dunal, Monographie de la Famille des Anonacees, 83 (1817).—This small tree, which in Nebraska is usually a shrub, occurs in southeastern Nebraska in Pawnee, Richardson, Nemaha, Otoe, and Saunders counties, and probably in one or two adjacent counties. While it is a shrub in Nebraska it is a tree attaining a height of thirty-five to forty feet, and a diameter of a foot in some portions of the United States. Its large fruits are much relished by many people, and greatly disliked by all the rest. In those parts of the state where it may be grown it might well be planted as a pretty ornamental shrub or small tree.

## 5. BLACK WILLOW.

*Salix nigra* Marshall, Arbustum Americanum, 139 (1785).—This species and the next have been so much confused as to make it difficult to determine the exact range of each. This one probably occurs throughout the state. The Black Willow attains with us a height of forty to fifty feet, rarely sixty to seventy feet, and a diameter of a foot or a little more, but in the eastern states it sometimes reaches to considerably more than a hundred feet, with a diameter of two to three feet. Its leaves are narrow, green above, and slightly paler beneath, and the petioles (leafstalks) are very short. The wood is light and soft, and well adapted for making into paper pulp. It is much used for making into charcoal. The slender shoots are used also for basket making. When we add the considerable fuel value of the wood, and take into account the ease of propagation by cuttings, it must be acknowledged that this tree is worthy of cultivation in suitable localities. There is no reason why many a waste place should not be filled with Black Willows and made to yield valuable returns year after year.

## 6. ALMOND WILLOW.

*Salix amygdaloides* Andersson, Ofversigt af Kongliga Vetenskaps Akademiens Forhandlingar (1858).—Apparently this species has the same range as the foregoing, namely, throughout the state. It is common along the streams, and may be distinguished from the Black Willow by the fact that in the Almond Willow the leaves are broader, and much lighter colored beneath, and the petioles (leaf stalks) of the Almond Willow are much longer than in the other species. The tree attains a height of sixty to seventy feet and when well grown a diameter of two feet, but it is usually smaller than these dimensions, especially in the western parts of the state. Its wood resembles that of the Black Willow, but it is a little lighter in color, and a little heavier in weight. The wood has similar uses to that of the Black Willow, and there is no doubt that this species could be profitably grown for fuel and other purposes.

## 7. SHINING WILLOW.

*Salix lucida* Muehlenberg, Neue Schriften der Gesellschaft Naturforschender Freunde zu Berlin, IV. (1803).—Occurs in Cass county. This is a small tree with a bushy appearance, and in fact it is more often a shrub than a tree. It is sometimes eighteen to twenty feet in height, with a smooth bark, and the twigs are yellowish-brown and shiny. On account of its small size this tree has little value, although no doubt its wood might be used for the production of charcoal.

## 8. SAND-BAR WILLOW.

*Salix fluviatilis* Nuttall, Sylva of North America (1842).—Common throughout the state in moist situations, especially on sand-bars in streams. It is the most abundant species on the sand-bars and islands of the Platte river. This is a most variable species as to the narrowness of the

leaves, which ranges from almost linear to lanceolate, and also as to the size and height of the tree itself. In some places the tree attains to the height of twenty or more feet, while in others it is a shrub not over a yard or so in height. Occasionally it becomes a large tree sixty to seventy feet high, and with a trunk a foot in diameter. Its wood is compact, and still heavier than the Almond Willow. Its color is reddish brown, and it is probably more durable than most willows.

#### 9. BEBB'S WILLOW.

*Salix bebbiana* Sargent, Garden and Forest, VIII., November (1895).—

Reported from Dawes and Sioux counties, but probably more widely distributed. Although a shrubby plant with us, this species attains tree-like dimensions in some regions, being as much as twenty to twenty-five feet in height. It has gray hairy twigs and dull green leaves on short petioles. It has little value economically.

#### 10. DIAMOND WILLOW.

*Salix missouriensis* Bebb, Garden and Forest, 8 (1895).—The tree here

referred to is the one to which the common name of Diamond Willow has been applied. For some years it was supposed that the variety *vestita* of *Salix cordata* was this tree, and it was so named in my previous lists, but that has been determined by Sargent to be an error.—Common along the Missouri and Niobrara rivers, and also on the Loup and Republican rivers, as well as in Banner and Scott's Bluff counties. The Diamond Willow has been well known to many Nebraskans for a long time, but it is only within the last few years that it has been given specific rank. It is sometimes a tall shrub, and it ranges from this to forty or more feet in height. Its bark is gray, and the twigs are gray-hairy. The leaves are pale beneath. The wood is dark brown, and is said to be durable when used for fence posts. Many of the stems and branches have diamond-shaped depressions upon the surface, from which the common name has been derived. These are now thought to be due to the punctures of certain insects, resulting in the death of the cambium in diamond-shaped areas.

#### 11. QUAKING ASPEN.

*Populus tremuloides* Michaux, Flora Boreali-Americana, 11 (1803).—Occurs

in the western counties of the state from Banner to Sioux, Dawes, and Sheridan. It has been reported from the southern counties, but this is probably an error. The Quaking Aspen is a mountain tree which has come into the state from the west, accompanying the Pines with which it is associated in the Rocky mountains. It is a most useful tree in the Wyoming and Colorado mountains, always coming in whenever the pines or other conifers are destroyed by fire, and holding the ground until the pines spring up again. A few years after a great forest fire the mountains are covered with these quick-growing trees, which do not make a dense enough shade to prevent the growth of little pines, in fact the conditions for the springing up of pines are

better by far than where there are no Aspens. Thus the Aspens serve a good purpose in the re-foresting of the mountains, and where man does not interfere the pine forests will certainly follow the Aspen growth.

#### 12. BALSAM POPLAR.

*Populus balsamifera* L. Sp. Pl. 1034 (1753).—In previous lists this has been given as the variety *candicans*, but I am confident that our tree is the species proper and not the variety.—Occurs in Sioux county.

This northern tree comes into the state from the mountains westward, and grows in such a limited area that it has no commercial importance. It is brought into cultivation in some places and makes a pretty tree.

#### 13. NARROW-LEAF COTTONWOOD.

*Populus angustifolia* James, Long's Expedition, 1, 497, (1823) —In a few canyons in the Wild Cat mountains in Scott's Bluff county, and also in canyons in Pine Ridge in Sioux county. This interesting Cottonwood is common in the mountains west of Nebraska, and it comes down into the state in but two regions, as just indicated. The tree has much the appearance of the willow, the leaves being long and narrow. It attains a height of from thirty to sixty feet, and further west occasionally has a diameter of trunk from eighteen inches to two feet. The wood is darker than that of the common Cottonwood, and is a little more compact and slightly heavier. Its fuel value is also slightly greater than that of the common Cottonwood.

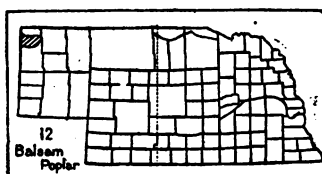
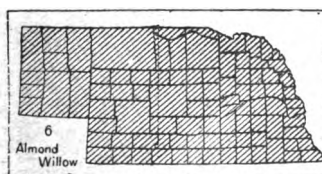
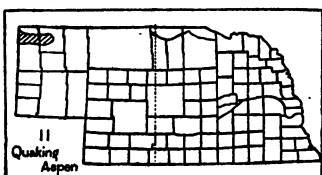
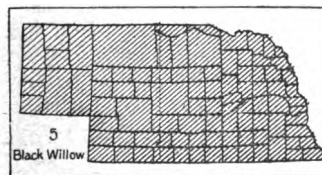
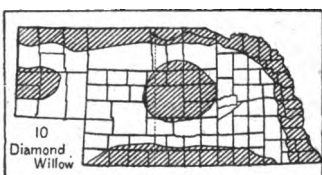
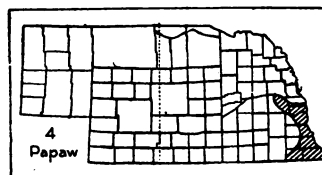
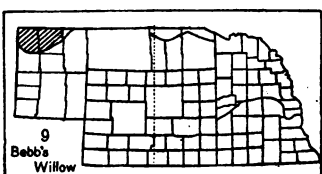
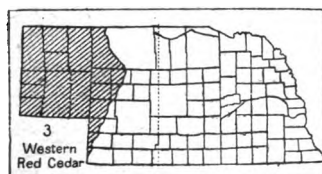
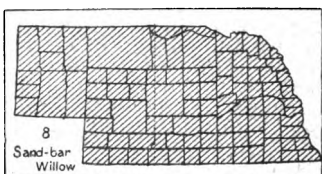
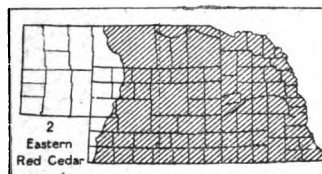
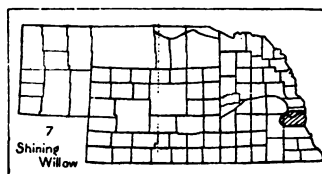
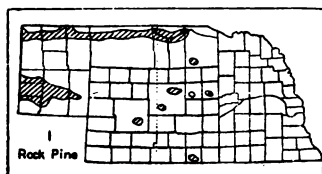
#### 14. RYDBERG'S COTTONWOOD.

*Populus acuminata* Rydberg, Bulletin of the Torrey Botanical Club, 20:50 (1893). (Silva, IX., 172.)—In the canyons of the Wild Cat mountains in Scott's Bluff county. While it is known to occur in the Black Hills, it has not yet been discovered in any part of Pine Ridge in Sioux county.

Until 1891 this species was confused with the Narrow-leaf Cottonwood, and in some places with the common Cottonwood. In the city of Colorado Springs, in Colorado, it has been planted along the street sides for many years, and it was not distinguished from the common Cottonwoods; in fact it was supposed to be of that species. In order to separate the two species, it is necessary only to examine the leaves, which are pointed below and finely serrated on the margins in the new species, while in the common Cottonwood the leaves are truncate-based and coarsely serrated. The wood appears to be much like that of the common Cottonwood.

#### 15. COMMON COTTONWOOD.

*Populus deltoides* Marshall, Arbustum Americanum, 106 (1785).—This has borne the name of *P. monilifera* Aiton in previous lists and in Gray's Manual. In Coulter's Manual it is *P. angulata* Aiton, while in De





Candolle's *Prodromus* XVI., 2 (1868), it is *P. canadensis* Moench.—Common throughout the state.

This quick-growing tree is one of the most important in the state. It is propagated very easily, and grows with such rapidity that within a few years the settler is able to supply himself with fuel and some of the wood which he needs in making various things about his buildings. As a shelter from the fierce blasts of winter, and the equally fierce midsummer's sun it has proved its usefulness to both man and beast. Rightly seen it is a beautiful tree, and may well claim a place for this purpose alone. I have seen Cottonwood trees that rivalled the Elm in beauty and stateliness. Here and there along the streams are to be found giants with trunks four to six feet in diameter, whose great tops spread outward and upward into a mass of delicate green against the sky, and with a form as perfect as that of any tree I have ever seen. It is only when the tree is sending out into the breeze its thousands of cotton-covered seeds that we find it to be troublesome. And yet when we remember that we have here a beautiful mechanism for the distribution of the seeds, and that every little fluffy bit of floating cotton is carrying a tiny plantlet, a minute tree in fact, it may make us more tolerant when we find our coats flecked with white. This cotton-shedding period lasts for but a short time, and all of the rest of the year the Cottonwood is one of the cleanest of trees. I have often admired the beautiful white branches of a particular tree under which I have walked every day for the past eight years, and at night when the whole top is lit up with the bright electric light, bringing out the silvery white of the branches against the background of green leaves I am always compelled to stop and look again and again at the beautiful tree.

I have several times called attention to the fact that the common opinion as to the uselessness of the wood for fuel and other purposes is unfounded. From a careful study of the tables of the fuel values of the woods of the United States I have been able to show that weight for weight Cottonwood has a higher heat-producing value than any of the woods ordinarily used for fuel in Nebraska. It is only when we compare the woods by bulk that Cottonwood seems to be inferior, but then it must be remembered that Cottonwood grows so much faster than any other wood that this is entirely overcome. We can grow from six to fifteen times as much wood in a Cottonwood tree as in any of the Ash, Oak, Walnut, or Hickory trees, and when we calculate the heat-values we find that the Cottonwood produces fully five times the heat that is to be obtained from the most rapid-growing of the Ashes, and the figures for the other trees are still more favorable for the Cottonwood.

As to the value of Cottonwood for construction I may quote from a recent letter written by Hon. R. W. Furnas, who has had almost a half century of experience with the Cottonwood in Nebraska. He says, "Let me say a word for the Cottonwood as the friend of the pioneer. It was the easiest grower of all the seedlings we first used to

plant out. It grew readily almost wherever it was planted—grew quickly, giving the earliest return. There is no lumber that holds nails better; scarcely any other that will last longer under cover, in the dry. There is a good nice house in this county (Nemaha) built entirely of Cottonwood timber, planted and grown on the farm of its owner. In early steamboat days the captains would give more for half seasoned Cottonwood for fuel than for any other, and said that it made better and more valuable steam heat than any other wood." (Letter dated April 1, 1904.)

#### 16. BASSWOOD OR LINDEN.

*Tilia americana* L. Sp. Pl. 514 (1753).—Southeastern to northern counties from Jefferson to Gage, Richardson, Cass, Saunders, Douglas, Knox, Rock, Brown, and Cherry, and in a single station in Nance county.

This beautiful tree is often planted in the eastern part of the state, and in and about Lincoln there are many thrifty trees. It is worthy of more attention on the part of those who plant for ornamental purposes. Its usefulness as a honey producing tree should commend it to the bee-keepers of the state. There is no reason why it should not be very generally planted in all of the eastern counties.

#### 17. WHITE ELM.

*Ulmus americana* L. Sp. Pl. 226 (1753).—Throughout the state, along rivers and smaller streams, in some places rare and much scattered, but in other places, especially in the eastern portions, sometimes very abundant.

No other tree approaches the White Elm for shade and ornamental purposes in this part of the country. While it can not thrive where there is a deficiency in the amount of moisture in the soil, there are few places where it may not be grown in Nebraska with the addition of a little water when the rainfall is less than usual. Under irrigation it grows vigorously, and after it is well started it does well in regions where it would not grow when younger. Its roots when once they have penetrated the lower layers of the soil are able to supply enough moisture for all of the demands made upon the tree. As a tree for planting on the grounds around the dwelling house the Elm is unexcelled. Already there are to be seen many stately trees in eastern Nebraska which were set out by the early settlers. Along the streams in all parts of the state there may be found many trees of the same beauty and symmetry as the famous trees in the Connecticut valley. I have seen trees whose trunks were fully five feet in diameter, and whose spreading tops covered at least an eighth of an acre of ground. It should be planted by everybody who owns a piece of ground. We can not have too many beautiful Elms.

#### 18. ROCK ELM.

*Ulmus racemosa* Thomas, American Journal of Science, 19:170 (1831).—Known to occur in but two places in the state, viz: near Meadville,

Keya Paha county, and near Plattsmouth, Cass county, but probably to be found elsewhere in the northern and eastern counties.

Without question this tree has been confused with the White Elm, and indeed it is not easy to distinguish them unless one has the flowers or fruits (seeds). The twigs are more or less marked with rows or ridges of cork, and this should enable one to recognize the species, but apparently this feature is not as well marked as it is in eastern trees. The wood is superior to that of the White or the Red Elm, being harder and more durable. Our tree planters in eastern Nebraska should give it more attention, as the timber will be valuable when the trees attain sufficient size.

#### 19. RED ELM.

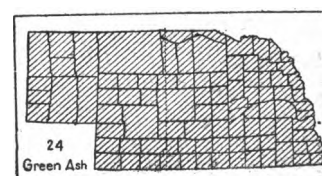
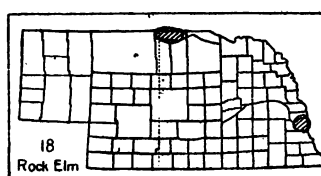
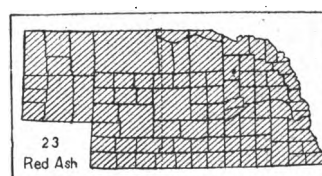
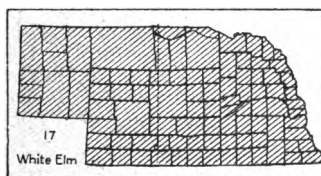
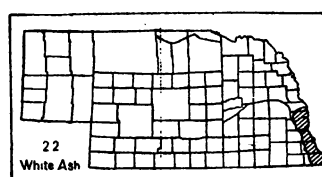
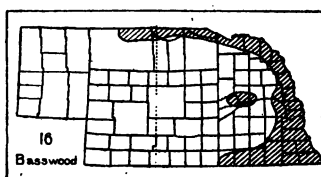
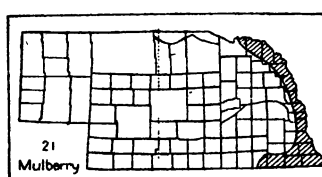
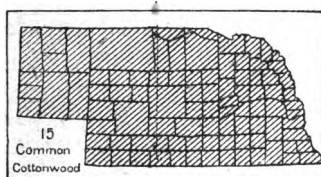
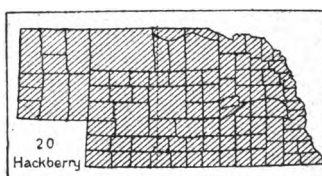
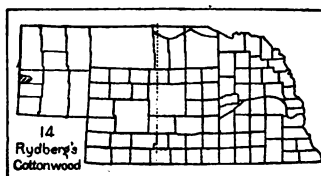
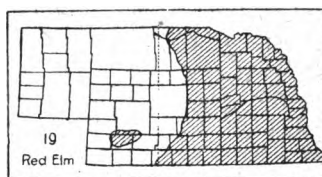
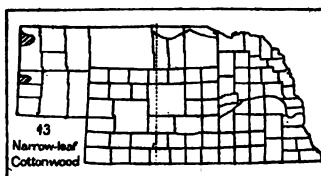
*Ulmus fulva* Michaux, Flora Boreali-Americana, 1:172 (1803). In some recent lists this bears the name *U. pubescens* Walter, Flora Caroliniana (1788), and there is reason to believe that this may be the prior name.—Common in the eastern part of the state to Franklin, Adams, Buffalo, and Brown counties, and reported from the valley of Medicine Creek in Frontier county.

On the University Campus there are a number of good trees of the Red Elm which show that they are good trees for planting on grounds. Throughout the city there are many more and in all cases they appear to be as good as the White Elm so far as the first few years of growth are concerned, but there can be no doubt that when the two trees have reached their maturity the White Elm will be the finer tree. Still it is a good thing to plant the Red Elm also. It may be noted in passing that there is one objection to the Red Elm, *i. e.*, that sometimes the boys in the neighborhood discover that the bark is edible, and cut large pieces from the trunk for their use. I have seen some trees in Lincoln which were badly injured in this way. Fortunately few boys are able to distinguish the Red ("Slippery") Elm from the White Elm, and the taste of the bark of the latter is not such as to encourage bark-chewing on the part of the boys.

#### 20. HACKBERRY.

*Celtis occidentalis* L. Sp. Pl. 1044 (1753).—More or less common throughout the state, but less abundant in the west.

Few trees are better adapted for planting for ornamental purposes than the Hackberry, as its tough branches are able to endure any amount of beating by the wind without injury. It is very rare indeed that one finds a tree that has been injured either by winds or by sleet or wet snow. Then, too, the trees are remarkably free from insect pests, the only one of any importance being a minute mite which produces little clusters of twigs ("witch brooms") which disfigure some of the trees. The tree is about as quick-growing as the Elm, to which it is related, and the wood has a good deal of value for fuel,



ranking for this purpose a little higher than Green Ash, and a little lower than White Oak.

#### 21. MULBERRY.

*Morus rubra* L. Sp. Pl. 986 (1753).—In the southern and eastern portions of the state from Jefferson county to Richardson, Nemaha, Sarpy, Burt and Cedar.

As this species is a native of the state it should be planted for its fruits which are much better than those of the so-called Russian Mulberry.

#### 22. WHITE ASH.

*Fraxinus americana* L. Sp. Pl. 1057 (1753).—In eastern Nebraska from Sarpy county southward.

Although this tree is found only in a narrow strip along the eastern portion of the state, it may be grown considerably further west in favorable localities. Where it is well grown it attains to the height of a hundred feet or more, and a diameter of three or four feet. I have seen good trees in the rich lowlands along the Missouri river in Sarpy county which were seventy-five or eighty feet high, and nearly two feet in diameter. Few trees have a higher value for their timber than the White Ash, the wood being particularly strong and tough, while at the same time light in weight. Its use in the manufacture of agricultural implements, and in making oars and light spars is well known. In furniture making also it is much used, and some of the finest interior finishings are made of White Ash lumber.

#### 23. RED ASH.

*Fraxinus pennsylvanica* Marshall, Arbustum Americanum, 51 (1785). This is the *F. pubescens* Lamarck (1786), which name it bears in Gray's and Coulter's Manuals.—Throughout the state, but less abundant than the next species.

There is very little difference between this and the next species, in fact I am much inclined to doubt the distinctness of the two. In the Red Ash the young twigs are downy, while in the Green Ash they are smooth; there is also the same difference in the leaves, but these are not accompanied with any other differences, either in the trees themselves or their fruits, and for this reason I suspect that we have here merely individual and not specific differences.

#### 24. GREEN ASH.

*Fraxinus lanceolata* Borkhausen, Handbook Forst. Bot., 1800. Sargent, Silva of North America, VI., 50 (1894). It afterwards received the name *F. viridis* by Michaux filius in Histoire des Arbres in 1813, and the latter name has been very generally adopted by American botanists, and is still used in Gray's and Coulter's Manuals, but this name is clearly antedated by the one given above.—Common along streams throughout the state.

The Green Ash resembles the White Ash in general appearance and

in the quality of the wood, but the tree is smaller and less inclined to grow upright into a tall tree with an elongated unbranched trunk. It does not, therefore, produce as large logs for sawing into lumber. Yet since the best and toughest timber from the White Ash comes from the younger and smaller growth, this difference in the two trees is not as important as it would seem to be at first sight. There is no reason why a great deal of the supply of "White Ash" timber might not be obtained from the vigorous trees of the Green Ash. The timber is given by the best authorities as a little more elastic under stress, and a little stronger under breaking tests than that of the White Ash.

#### 25. PRAIRIE APPLE, OR WESTERN CRAB APPLE.

*Malus iowensis* (Wood) Britton, Illustrated Flora of the Northern States and Canada (1897). This is the *Pyrus iowensis* (Wood) Bailey of the "Check List" and the *Pyrus coronaria iowensis* (Wood) of some previous lists.—In eastern Nebraska from Gage to Richardson, Johnson, Nemaha, Butler, Holt, and Brown counties.

This is one of the prettiest of our native trees for ornamental purposes. On the University Campus there is a fine tree ten or twelve feet high which is every year a mass of beautiful pink blossoms, attracting the visitor and commanding the admiration of every one.

#### 26. BLACKTHORN.

*Crataegus tomentosa* L. Sp. Pl. 476 (1753).—Eastern Nebraska from Richardson to Lancaster and Douglas counties.

#### 27. DOWNY HAW.

*Crataegus mollis* (Torrey & Gray) Scheele, Linnaea 21:569 (1848). This is the *C. coccinea mollis* T. & G. of the sixth edition of Gray's Manual and the *C. subvillosa* Sehrader of some lists.—With apparently the same range as the preceding, with which it is commonly confused.

#### 28. RED HAW.

*Crataegus colorado* Ashe.—This has hitherto been called *Crataegus coccinea* L. Sp. Pl. 476 (1753), but Professor Sargent decides that our tree is one of Ashe's new species.—Thomas county, along the Middle Loup and Dismal rivers.

#### 29. THORNY HAW.

*Crataegus occidentalis* Britton, Manual of the Flora of the Northern States and Canada (1901).—In previous lists this has borne the name *Crataegus coccinea macracantha* (Lodd.) Dudley, Bulletin of Cornell University, 2:33 (1886). In the "Check List" this was considered to be a distinct species under Loddige's original name *C. macracantha*, but it is now regarded as distinct from that species also.—In northern counties from Knox to Cherry, and also in Thomas county along the banks of the Middle Loup river.

The Hawthorns (or Haws, as they are commonly called,) are in a state of extreme confusion, which has been increased by the zeal which

many systematic botanists have recently shown in the description of new species founded upon differences which are in my opinion often entirely inadequate. Some of these days we must have a revision of the whole genus, and then it is to be hoped that many of the hastily formed species will be reduced to mere synonyms of well established species.

### 30. JUNE BERRY.

*Amelanchier canadensis* (L.) Medicus, Geschichte der Botanik unserer Zeiten, 79 (1793).—In southeastern Nebraska from Richardson county to Sarpy.

### 31. CHOKE CHERRY.

*Prunus virginiana* L. Sp. Pl. 473 (1753).—In the southeastern counties from Franklin to Richardson, Cass and Sarpy.

This must not be confused with the Dwarf Wild Cherry (*Prunus demissa*) which is commonly, but erroneously called "Choke Cherry" by the people in central and western Nebraska.

### 32. WILD CHERRY.

*Prunus scrotina* Ehrhart, Beitrage zur Naturkunde, 3:20 (1788).—South-eastern Nebraska from Franklin to Richardson and Cass counties.

This tree yields such a valuable wood that it should be much more extensively planted in the eastern part of the state where it is known to grow well under cultivation.

### 33. WILD PLUM.

*Prunus americana* Marshall, Arbustum Americanum, 111 (1785).—Common throughout the state.

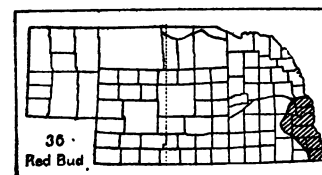
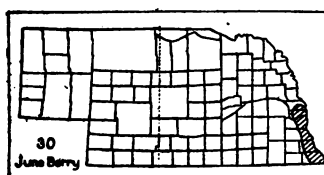
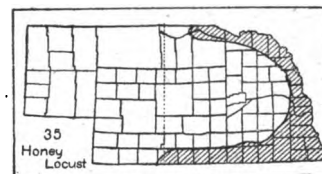
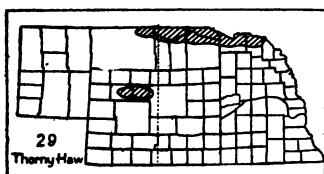
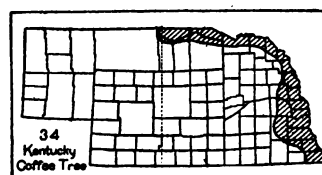
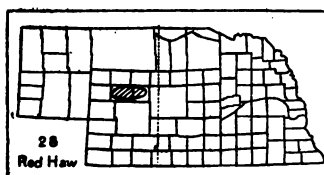
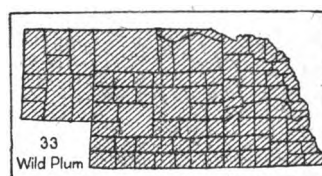
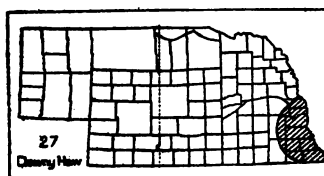
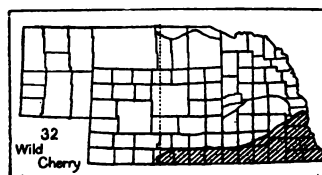
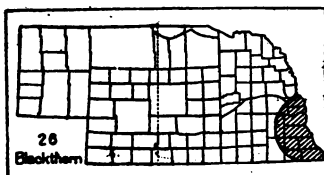
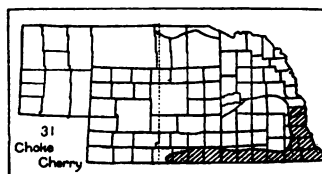
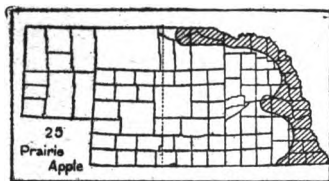
### 34. KENTUCKY COFFEE TREE.

*Gymnocladus dioica* (L.) Koch, Dendrologie, 1:5 (1869). This is *G. canadensis* Lamarck (1783), and of the ordinary manuals. It was first named *Guilandina dioica* by Linne in Sp. Pl. 381 (1753).—Eastern and northern Nebraska from Richardson county to Lancaster, Cuming, Dixon and Rock.

### 35. HONEY LOCUST.

*Gleditsia triacanthos* L. Sp. Pl. 1056 (1753). In nearly all publications the generic name is given as *Gleditschia* in spite of the fact that Linne spelled *Gleditsia*, evidently from *Gleditsius*, Latinized from the German *Gleditsch*.—Southern, eastern, and northern counties from Franklin to Richardson, Lancaster, Douglas, Dixon and Holt.

This is one of the most valuable of our native trees for planting in dry situations, as it withstands drought better than almost any other tree. Last summer I saw it in the Crimea, and the region around Odessa, Russia, under conditions of extreme drought, and everywhere was assured that it was one of the best trees for planting where the moisture is deficient. The wood, also, is valuable, and for this purpose alone it is worth planting in all of eastern Nebraska.





## 36. RED-BUD.

*Cercis canadensis* L. Sp. Pl. 374 (1753).—In southeastern counties from Richardson to Lancaster and Douglas.

In Nebraska this pretty tree does not grow large, rarely exceeding ten or twelve feet in height, but in more favorable regions it attains a height of fully fifty feet. Its odd habit of putting forth its pretty pink-purple flowers before the leaves show signs of appearing gives it an interest possessed by few other trees.

## 37. SYCAMORE.

*Platanus occidentalis* L. Sp. Pl. 999 (1753).—Along the Missouri river from Richardson county to Douglas.

Although the wood of the Sycamore is very valuable for certain kinds of work in the making of furniture and smaller ornaments, there is not yet sufficient demand for it to warrant planting it for this purpose. It is however a fine shade tree, and it is especially well suited for planting in cities and towns, where it seems to endure the peculiar conditions better than most other trees. A few of these trees ought to be found upon every farm, and no street in any of the towns and cities of eastern Nebraska should be without a number to give variety to the tree planting.

## 38. BUCKTHORN.

*Rhamnus lanceolata* Pursh, *Flora Americae Septentrionalis*, 166 (1814).—In eastern and northern Nebraska from Gage county to Saunders, Sarpy, Washington, Dixon, Keya Paha, and Cherry.

This is a small tree not well known by any but the botanists and a few people who are familiar with our rarer kinds. It might well be introduced into cultivation as a pretty deep green small-sized tree.

## 39. INDIAN CHERRY.

*Rhamnus caroliniana* Walter, *Flora Caroliniana*, 101 (1788).—In Saunders and Cass counties.

This tree resembles the Buckthorn very closely, with which it has been confused.

## 40. BUFFALO BERRY.

*Lepargyrea argentea* (Pursh) Greene, *Pittonia* 2:122 (1890). This small tree is still commonly called *Shepherdia argentea* in catalogues, as it is in Gray's and Coulter's Manuals.—From Cedar, Dixon, Saunders, and Franklin counties westward to Cheyenne, Scott's Bluff, Sioux and Dawes.

The pleasantly acid fruits are so delicious that the tree (or tall shrub) is worthy of general cultivation. There can be no doubt that this might be made one of our most attractive berries if we were to take up its improvement under cultivation. Even in the wild state the berries are as good as many of our garden fruits, rivalling the cranberry which it replaces in many a home on the Plains. Although the berries are generally red, there are found now and then amber-colored

berries, which appear to be a little less acid than the red kinds. I suggest that these amber-colored trees should be taken as the wild stock upon which improvements are to be made, as in this way we might expect earlier favorable results.

#### 41. BUCKEYE.

*Acsculus glabra* Wildenow, Enumeratio Plantarum Horti Regii Botanici Berolinensis, 405 (1809).—In extreme southeastern counties. Pawnee, Richardson and Nemaha.

The Buckeye is found in so small a part of the state that it is scarcely known except as it is occasionally cultivated.

#### 42. MOUNTAIN MAPLE.

*Acer glabrum* Torrey, Annals of the Lyceum of New York, 2:172 (1826).—In the mountain regions of Sioux and Scott's Bluff counties.

Although this tree occurs in but a small area in the extreme western portions of the state, I have no doubt that it might be successfully grown throughout the state. In Colorado I have seen some fine trees in gardens and parks, and there is no tree which responds more readily to care and cultivation. In its wild state it is a shrubby tree or large spreading shrub, but when cared for it becomes a tree resembling the Silver Maple, but smaller, and with more of a drooping habit. Its leaves are interesting on account of the fact that they show all gradations from simple leaves which are deeply lobed to those which are fully compound. Our people who wish to add a novelty should not neglect this pretty tree.

#### 43. SILVER MAPLE.

*Acer saccharinum* L. Sp. Pl. 1055 (1753). This tree is commonly given the name *A. dasycarpum* Ehrhart, Beitrage zur Naturkunde, 4:24 (1789), but the name, given by Linne certainly belongs to this tree, since the specimens in his herbarium with this name attached, as well as the original description, agree fully with our tree. Dr. Gray long ago (1839), in a letter to Dr. Torrey (Letters of Asa Gray, 1:150), called his attention to the fact that Linne referred to the tree subsequently described by Michaux (Flor. Bor.-Am., 2:253, 1803) as *A. eriocarpum*, which is identical with Ehrhart's *A. dasycarpum*. For some reason, not now regarded as valid, no effort was made to restore this name, and so we find that in all the editions of Gray's Manual, down to the present, the error has been permitted to stand.—In the counties east of the 98th meridian, where it grows naturally along the streams and in the low lands. West of this line it is planted abundantly, and in nearly all parts of the state where sufficient water is available it thrives.

The Silver Maple (often called Soft Maple) is too well known to need description. It is our only species of true Maple which grows wild in the eastern part of the state contrary to what many people think. I have many times been assured that the Sugar Maple (Hard Maple) and the Red Maple grow wild in Nebraska, but this is an error

for both species, neither one being true natives, and in fact very few planted trees of either species are to be found within our boundaries.

#### 44. BOX ELDER.

*Acer negundo* L. Sp. Pl. 1056 (1753). This is the *Negundo aceroides* Moench (Methodus Plantas Horti Botanici et Agri Marburgensis, 1794), and this name has been generally adopted in American manuals. In Gray's and Coulter's Manuals this name is used. Since, however, this tree is really a maple, there is no good reason for abandoning the name originally given by Linne.—Throughout the state.

Last summer I found that in the excessively dry regions bordering the Black Sea, and in many places in Transcaucasia the Box Elder is regarded as one of the best trees to resist drought. In the regions mentioned it is the most valuable tree for planting, and I am told that it is planted in the region east of the Caspian Sea, and into Turkestan, a thousand miles or more still further east.

#### 45. SUMACH.

*Rhus copallina* L. Sp. Pl. 266 (1753).—Occurs only in the extreme southeastern part of the state, Richardson county, where it is a mere shrub. In the South it is a small tree.

#### 46. BUTTERNUT.

*Juglans cinerea* L. Sp. Pl., ed. 2, 1415 (1763).—Found sparingly in the southeastern part of the state from Gage to Johnson, Nemaha, Otoe, and Cass counties.

The Butternut might well be planted for ornament, and also for its valuable wood. While not as valuable as Walnut, it is allied to it and commands a good price now, and no doubt this will advance rapidly in the future, as the Walnut becomes scarcer.

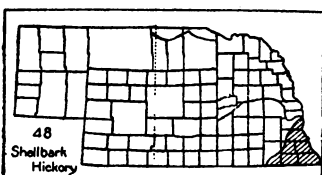
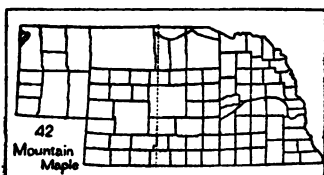
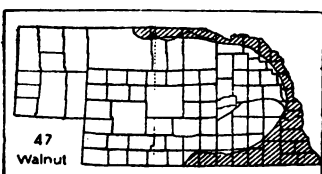
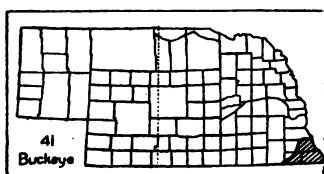
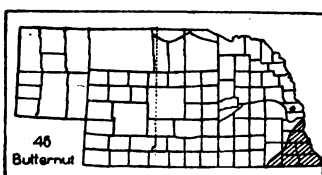
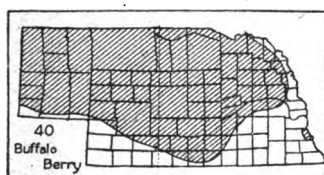
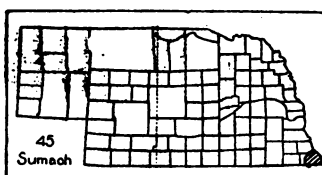
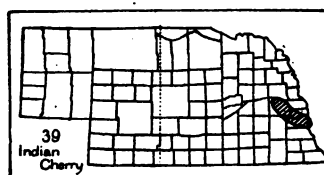
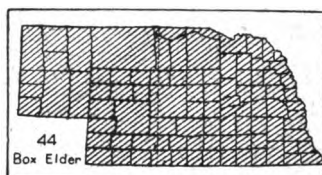
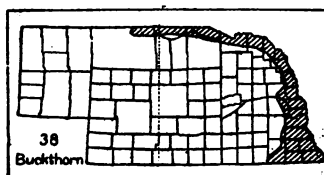
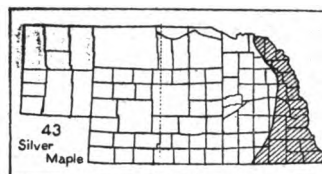
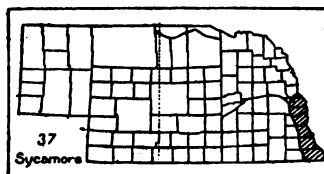
#### 47. WALNUT.

*Juglans nigra* L. Sp. Pl. 997 (1753).—Found quite abundantly in the southern, eastern, and northern portions of the state, from Harlan county, Saline, and Lancaster to Burt, Dixon, Knox, Rock and Cherry, and eastward.

Wherever this tree can be grown it should be freely planted. It is a beautiful tree when well grown and especially on large grounds attains to a stateliness which adds much to the landscape. I was much pleased last summer to see a magnificent tree of the Walnut at Livadia in the Crimea, the country seat of the Russian Emperor. It grew sufficiently isolated so that its top had become a dome-shaped canopy of regular proportions, and in fact was one of the most beautiful trees on the estate. The wood has long been one of the most expensive in the United States, and there is no question as to the ultimate profit to be reaped from large plantations of Walnut trees for its wood alone.

#### 48. SHELLBARK HICKORY.

*Hicoria ovata* (Mill.) Britton, Bulletin of the Torrey Botanical Club, 15:283



(1888). This was first called *Juglans ovata* by Miller in the Gardener's Dictionary, edition 8 (1768). In 1808 Rafinesque separated the hickories generically from the walnuts under the name *Hicoria* (by a typographical error printed "*Scoria*"); but Nuttall, in ignorance of this, made a genus with the same limitations, but with the name *Carya* (Genera of North American Plants, 2:220, 1818). Nuttall's name was taken up by botanists generally, that of Rafinesque being allowed to remain in obscurity until it was revived by Britton in 1888. Through a mistake by Michaux (*Flora Boreali-Americana*, 2:193, 1803) this was called by him *Juglans alba*, but it is not the *J. alba* of Linne (*Sp. Pl.* 997, 1753). Nuttall transferred this mistake, calling this tree *Carya alba*, the name by which it has generally been known. In Gray's Manual, even in the latest edition, Nuttall's name is used.—Common in the southeastern counties from Gage to Cass.

This tree is worthy of extensive planting on account of the excellent nuts which it yields, as well as for its superior wood, which is useful in many ways.

#### 49. BIG HICKORY NUT.

*Hicoria laciniosa* (Michaux) Sargent, *Silva of North America*, VII., 157 (1895). This is the *H. sulcata* (Willd.) Britton of previous lists, and is the *Carya sulcata* of Gray's Manual.—In the southeastern counties only, certainly in Richardson county, and reported from Sarpy.

#### 50. MOCKER-NUT.

*Hicoria alba* (L.) Britton, *Bulletin of the Torrey Botanical Club*, 15:283 (1888). This is the *Carya tomentosa* of Gray's Manual.—Said to occur in eastern Nebraska by Professor Sargent. I have no specimens of this species.

#### 51. PIG-NUT.

*Hicoria glabra* (Mill.) Britton, *Bulletin of the Torrey Botanical Club*, 15:283 (1888). This is the *Carya porcina* of Gray's Manual.—In Cass and Richardson counties.

#### 52. BITTER HICKORY.

*Hicoria minima* (Marshall) Britton, *Bulletin of the Torrey Botanical Club*, 15:283 (1888). This is the *Carya amara* of Gray's Manual.—This is the most widely distributed of our hickories, occurring in the southeastern counties, Sarpy, Cass, Lancaster, Johnson, and Pawnee.

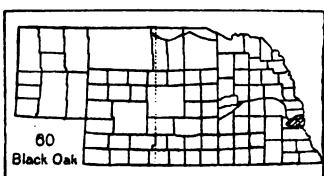
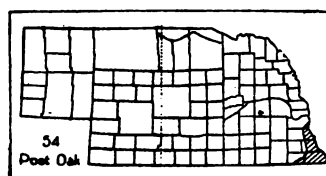
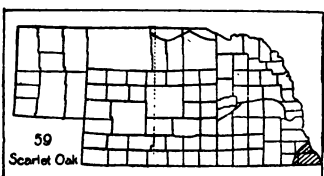
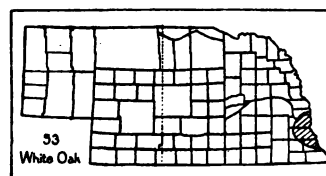
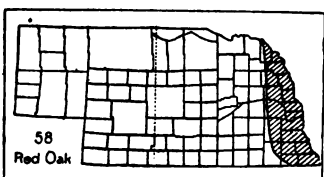
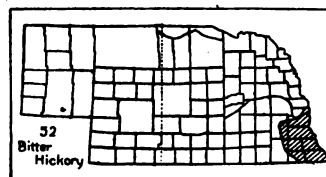
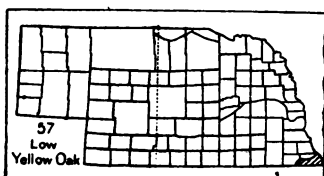
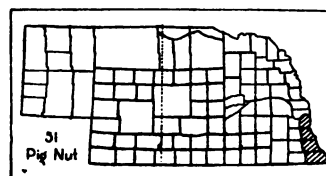
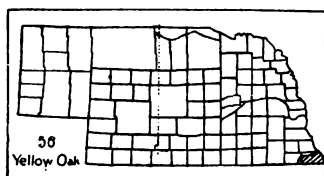
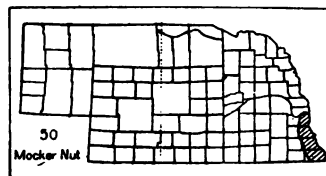
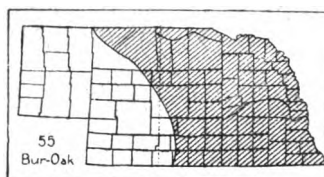
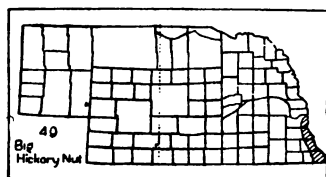
#### 53. WHITE OAK.

*Quercus alba* L. *Sp. Pl.* 996 (1753).—Confined to the southeastern part of the state, and certainly known to occur in Cass and Nemaha counties.

Should be planted for its beauty of form, as well as for its valuable wood, which excels that of every other species of Oak in the northern states.

#### 54. POST OAK.

*Quercus minor* (Marshall) Sargent, *Garden and Forest*, II., 471 (1889).—Said by Professor Sargent to occur in southeastern Nebraska.



## 55. BUR-OAK.

*Quercus macrocarpa* Michaux, Histoire des Chenes de l'Amerique, 2 (1801).—The most widely distributed of our oaks, occurring throughout the eastern half of the state west to an irregular line drawn from Harlan county to Custer and Cherry.

Although not quite as valuable a tree as the White Oak, the Bur Oak is well worthy of general cultivation. It can be planted successfully in all of the eastern half of the state, and this is more than we can hope for the planting of the White Oak. The Bur Oak supplies a good fuel, and its timber falls but little short of the excellence of the White Oak itself. It is worthy of extensive cultivation.

## 56. YELLOW OAK.

*Quercus acuminata* (Michx.) Sargent, Garden and Forest, VIII., 93 (1895). This is the *Q. prinus*, var. *acuminata* of the fifth edition of Gray's Manual, and the *Q. muhlenbergii* of the sixth edition. This last name was used in the later lists issued by the botanical department of the University.—In Richardson county.

## 57. LOW YELLOW OAK.

*Quercus prinoides* Willdenow, Neue Schrift. Gesell. Nat. Fr. Berlin, 3:397 (1801).—In Richardson county.

## 58. RED OAK.

*Quercus rubra* L. Sp. Pl. 996 (1753).—Next to the Bur Oak, this has the widest distribution in the state. It extends westward from Richardson county to Lancaster and northward to Dixon.

## 59. SCARLET OAK.

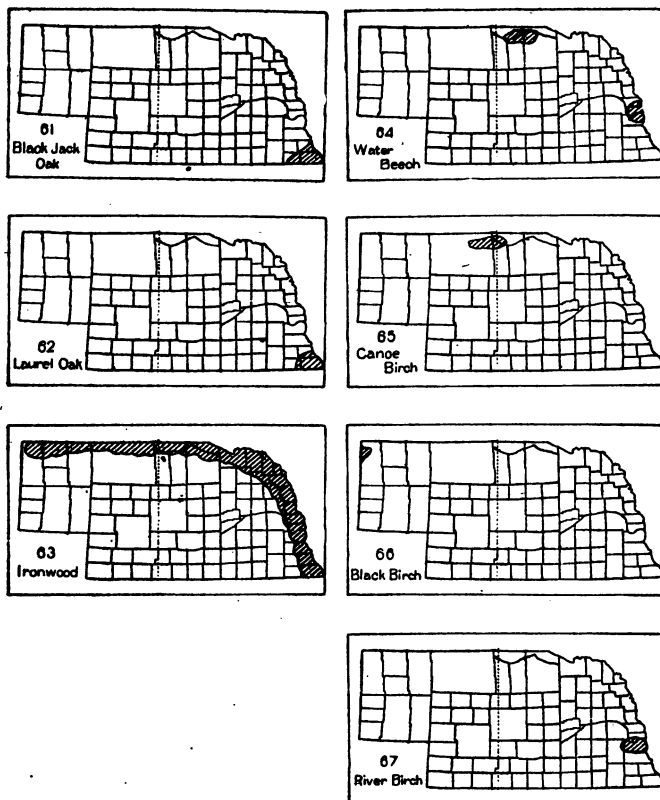
*Quercus coccinea* Muenchhausen, Der Hausvater, V., 254 (1770). This species has commonly been attributed to Wangenheim (1787), but Muenchhausen antedates him by seventeen years.—In Richardson and Nemaha counties.

## 60. BLACK OAK.

*Quercus velutina* Lamarck, Dictionnaire de Botanique, 721 (1783). This is the *Q. discolor* of Aiton (1789), the *Q. tinctoria* of Michaux (1803), and *Q. coccinea tinctoria* of De Candolle (1864), which name it still bears in Gray's Manual.—In the southeastern counties alone.

## 61. BLACK JACK OAK.

*Quercus marilandica* Muenchhausen, Der Hausvater, V:253 (1770). By a mistake in determination Wangenheim described this tree (1781) under the name *Q. nigra*, which Linne had applied to another tree, an error which has been continued to the present, still occurring in the latest edition of Gray's Manual.—In the southeastern counties, Richardson, Pawnee, and Nemaha.



## 62. LAUREL OAK.

*Quercus imbricaria* Michaux, Histoire des Chenes de l'Amerique, 9 (1801).

This species has been reported as occurring in southeastern Nebraska by Professor Sargent and others. I have not seen specimens collected within the state, but have specimens collected in Missouri a short distance from the southeastern corner of Richardson county. I think it likely that occasional specimens occur in the state.

## 63. IRONWOOD.

*Ostrya virginiana* (Miller) Willdenow, Species Plantarum, 4:469 (1805).—

In the eastern and northern counties, extending northwestward to Brown, Cherry, and even Sioux.

## 64. WATER BEECH, OR BLUE BEECH.

*Carpinus caroliniana* Walter, Flora Caroliniana, 236 (1788). This is the *C. americana* of the fifth edition of Gray's Manual, and the *C. vir-*



*giniana* of some previous lists.—What is apparently this species has been reported from Sarpy county, and somewhat doubtfully, also, from Brown county. It has probably been confounded with Ironwood.

#### 65. CANOE BIRCH.

*Betula papyrifera* Marshall, *Arbustum Americanum*, 19 (1785).—On the north slopes of the high bluffs, and in the ravines bordering the Niobrara river in Keya Paha, Brown, and Cherry counties.

The occurrence of this tree in the forest belts bordering the Niobrara river in northern Nebraska is one of the many oddities in the flora of the Plains. It is a puzzling question as to how it came into this isolated station, as it does not occur anywhere else on the Plains. It is at least four hundred miles from the Nebraska station to the nearest station in the northeast.

#### 66. BLACK BIRCH.

*Betula occidentalis* Hooker, *Flora Boreali-Americana*, 2:155 (1839).—Known to occur in Sioux county, possibly occurring also in Scott's Bluff and Banner.

This tree is abundant in the mountains westward, and creeps downward into Nebraska along with a number of other Rocky Mountain species.

#### 67. RIVER BIRCH.

*Betula nigra* L. Sp. Pl. 982 (1753).—Reported from Cass county.

I have some reason for doubting the correctness of the report upon which this species is admitted to the flora of the state.

# CEMENT AND ITS USE ON THE FARM

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By ERWIN H. BARBOUR,  
UNIVERSITY OF NEBRASKA



## CEMENT AND ITS USE ON THE FARM.

BY ERWIN H. BARBOUR, UNIVERSITY OF NEBRASKA.

The uses of cement have become so varied and the demand for it so great within the past few years that the attention of farmers should be directed to it as a building material of exceptional value. While engaged in the preparation of a report on cement and the possibility of its manufacture in Nebraska, as a part of Vol. II of the State Geological Survey, the writer believes that it may be expedient to offer a few hints on the subject of cement and what may be done with it to improve and beautify the farm and home. Cement is rapidly displacing large amounts of other building material, such as stone, brick, iron, and wood, which is but prophetic of its great future usefulness and is evidence of its thoroughly practical value. Though the writer in his experiments is confined to a small town lot and is thus debarred from testing the uses of cement on the farm, he has nevertheless visited many homes in the western, middle, and eastern states and wishes to record what the practical men are doing with cement as a building material. Among its larger and more striking uses we might mention that walls for buildings both large and small, and even solid buildings 16 stories high are being made of it. That is, dwelling houses as well as great business blocks are being made of cement, including walls, partitions, floors and ceiling. They are cast in solid cement without seams or joints. Such structures are fire proof, wind proof, and dust proof, and are literally like houses cut out of a solid rock. Great dams are made of it to impound water for irrigation or for power, dikes and barriers are built of it to check the destructive force of storms and waves, and abutments and piers are built of it for bridges and viaducts where it proves to be more serviceable than other material. It is also used extensively for piling, taking the place of the oak piles which used to be driven into soft ground to make stable foundations for great public buildings. It is cast into blocks, imitating pebbled, dressed, and carved stone of various designs, and is laid into buildings of elegance and permanence like the costly stone which it so beautifully imitates. It is used for street curbing, crossings, pavements, walks in public and private grounds, and as floors in business houses, stables and cellars.

Whether used as mortar in laying strong walls or for the more refined uses to which it is put, it is equally well adapted, and what is of particular significance is the fact that its use is not confined to the richer classes, for it is within the reach of all, and though the demand for it is going up, the price of it is going down. Furthermore, it does not require any technical knowledge or long apprenticeship to learn to use it. To the contrary, the beginner on the farm can use it, and can take advantage of his own abundant energy, thereby adding greatly to the usefulness and convenience of his place.

If a farmer wishes to set an iron post in a permanent position, for use as a hitching post, gate post, corner post, or for a clothes line, or trellis, he can scarcely hope to do better than to put into practice the methods of one set of farmers, described here for the benefit of others. He will proceed as follows: After digging or boring the hole to the depth which suits him he will then set the iron post or rod in position and pour around it enough concrete to fill the hole and a little more. This soon sets, and is permanent. By concrete is meant broken stone and hydraulic cement mixed, which sets like stone itself and ought to do service for twenty-five to fifty years or more. By building the artificial stone just a little above the surface the iron post is said to be less apt to rust off. In stretching barbed or woven wire fences a great strain is brought upon the corner posts and it is often of considerable importance to make anchors for the stays or braces of sufficient strength to hold the post in position. Where rock is at hand it seems

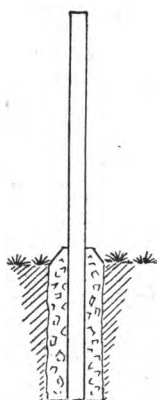


FIG 1  
An iron post  
with a cement  
base to make  
it stable

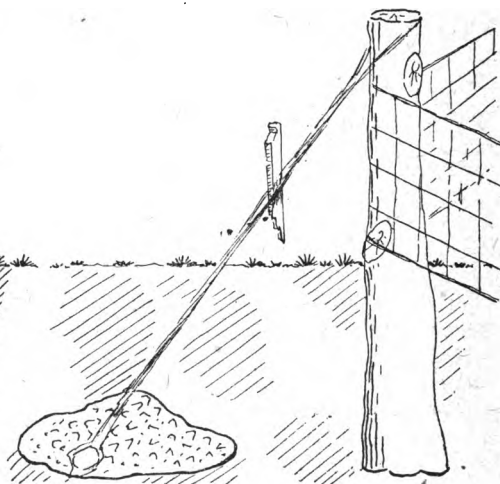


FIG. 2  
Corner post  
with cement  
anchor for  
guy wires

to be common practice to bury some large boulder to which a rod or strands of heavy galvanized wire are attached. But it so happens in this region of deep soil that even pebbles are rare and rocks are not to be found. What could serve the purpose better than to buy a bag of cement and make a concrete of broken stone, if obtainable, brick, etc., and cast it in a suitably deep hole where it is to set, thus making a lasting anchorage for the guy wires which are to hold the post in position.

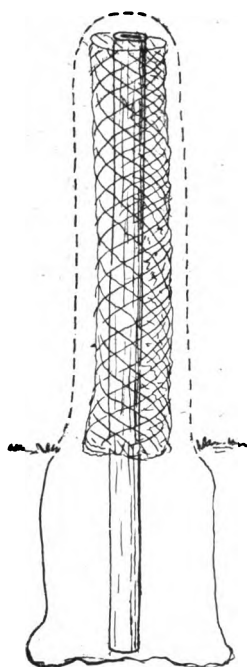


FIG. 3

A gas-pipe axis, surrounded by a loose wire cylinder, into which coarse concrete is poured and upon which finer concrete is spread, to make a strong, lasting hitching post.

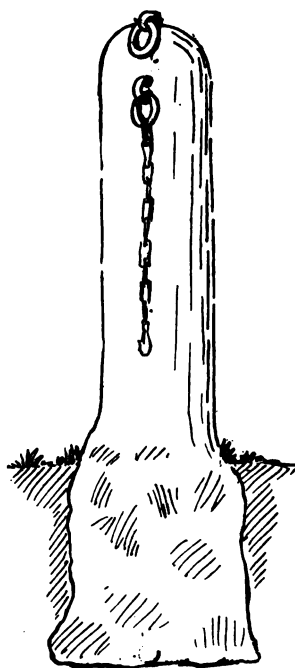


FIG. 4

The same, when done

If a horse block is desired, as is always the case on the farm as well as in the town, mix concrete and cast it between boards arranged in the order of stair steps. When the cement is set, the boards are knocked off and a serviceable block results, equal in appearance to stone blocks of much greater expense. If a curbing is desired along any walk or around a flower bed, dig a narrow trench and fill with cement as high as desired. This, when set, is like stone, and wears as well. If a small pond for gold fish is desired, and they are to be seen on many farms, build it of cement of good grade, trowelling it into the shape which suits best. If the floor of the porch needs constant painting and repairing, or if it warps and rots to your cost and continual annoyance, take a lesson from the farmers of southern Indiana and Ohio and build a cement floor and further trouble will end. It is easily swept or scrubbed, needs no paint or putty, is smooth, clean and decent and does not rot. They first lay a heavy course of slag, clinkers from

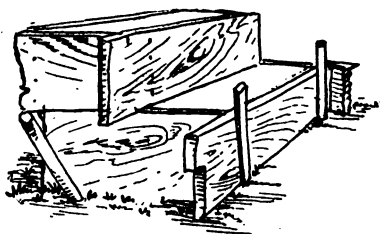


FIG. 5  
Boards set in position for casting a two-step horse block. After setting for several days, the boards and stakes are to be removed

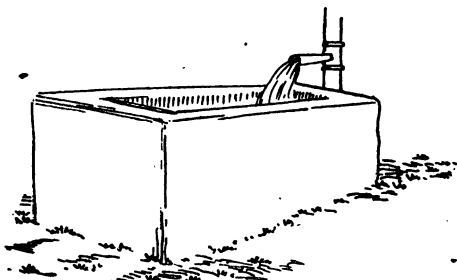


FIG. 6  
A stock-trough, made of hydraulic cement

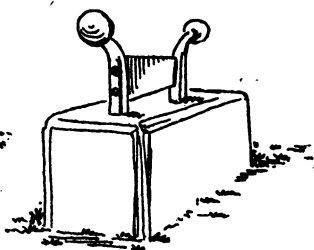


FIG. 7  
A foot-scraper, with cement block

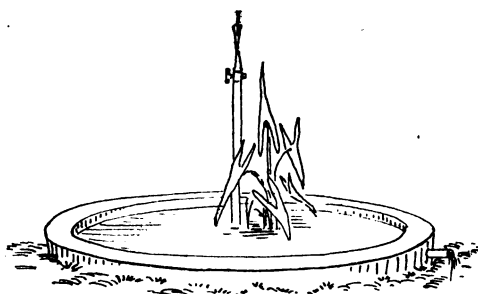


FIG. 8  
A home-made fish pond and fountain

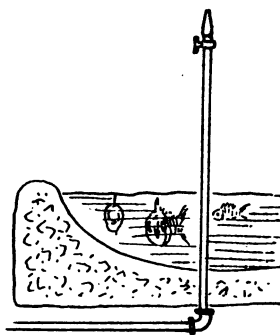


FIG. 9  
Same, in section



FIG. 10  
Curbing for a permanent, circular flower bed



FIG. 11  
Same, in section

stoves and furnaces, or of rock if handy; these are pounded down well and a course of crushed stone is laid on this foundation on top of which is laid the concrete and the whole trowelled down as smoothly as possible. Steps and walks are built in much the same way, and any farmer wishing to try the experiment of building porches, steps, or walks, and cellar or barn floors can always find someone in any town who can advise him how to proceed should he be in doubt from reading a report such as this, which is to be suggestive, and to show what may be done rather than to enter into the plasterer's domain and to tell how to do it. To pass from the house to the barn, if you have trouble with your stock tanks rotting out or rusting out, try building one of cement. Dig down a foot or so and lay a course of concrete made of good crushed stone and a high grade of hydraulic cement, then set up boards in proper form and pour in concrete and continue to build up as high as desired. It makes a tank which certainly looks well and is said to give excellent service. We have seen watering troughs built in the same fashion, which gave us the impression that here was an idea worth copying. Such troughs are generally sunk well in the ground and are rather shallow, and are so shaped as to escape rupture on freezing. One of the best things of the kind observed was a long swill-trough. This was raised but

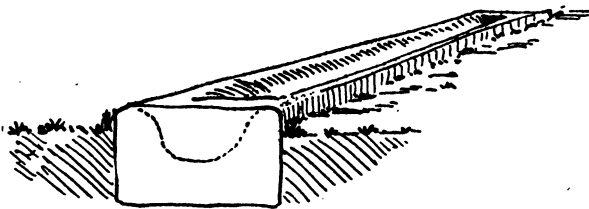


FIG. 12  
A cement swill-trough.  
well buried, so as to project  
but slightly above the sod.  
End dotted, to show  
shape of trough

little above the level of the ground and lids were provided so the trough was kept that much cleaner. When filled, the lids were raised and the swine admitted. The builder claimed that it had saved its price many times over, that it had been in service for years, and that there was no apparent reason why it should not last for his lifetime. Such permanent improvements as these are not only money getters for the owners, but also save the wear and tear and worry of constant planning. Every time a farmer builds a new trough, a certain amount of money and time must go into it, and this might, perhaps, be better employed in other improvements. It always seems like dead loss to be constantly rebuilding and repairing, and where one can afford it, it certainly seems better policy to build permanently. These troughs impress one favorably and the practical man's attention is directed to them as something doubtless to be recommended. We have seen small feed lots cemented over with marked success, as attested by the owners, who say that



every rain washes them perfectly clean, and swine while feeding do not lose any of the grain.

It is said that it would be profitable to prepare large feed lots in this way. Then the driveway leading to the barn could not be cleaner or better than when built of cement, and inside the barn, if the floor can be cemented, ideal conditions are realized. It is claimed by those who have tried the experiment, that while the first cost of putting down a cement floor may exceed that of the common plank floor, it does not cost nearly so much in the end. It is easily kept clean and certainly those seen by the writer seemed to be models of their kind, and showed no evidence of wear at the end of more than ten continuous years of service. But better than all is the advantage gained in two respects alone. The cement resting directly on the ground all rats and vermin are excluded once for all. Then the stable floor being as hard and close grained as stone itself, no stable waste is absorbed as in wood floors, to give off destructive and disagreeable ammonia gases afterward.

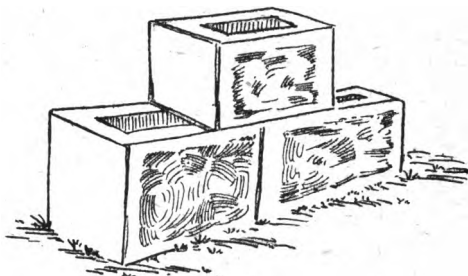


FIG. 13

Three blocks of hollow, artificial stone, as made by Reimers & Fried, of Lincoln, and extensively used for foundations and walls

Such stables are peculiarly free from barn odors. They are more easily cleaned and the owner would not change for any other form of floor. Ammoniacal gases are not only injurious to stock, but quite destructive of the varnish on carriages and vehicles. This difficulty seems to be fully met when the concrete floor is laid. For the cellar floor of the ordinary house nothing is better than cement, if one can afford it, and he cannot afford not to have it when he stops to consider that his house is to be his living place, which is to be sanitary or unsanitary according to certain conditions. The most sanitary floor is one of cement which excludes moisture and is readily swept and cleaned.

If one takes pains to observe, he will not have to go far until he sees houses built of concrete, but it must be remembered that they so closely resemble actual stone as to deceive, and so may be overlooked. On one farm we noticed a shed 18 feet square, of which the side walls, the floor, and even the roof, were made of cement. While still green, the plaster was laid off in squares by scratching it with a pointed tool, and the effect was that of the broken joints of masonry.

First a rough frame work was constructed of old stuff, then laths were nailed on, about a foot apart, upon which poultry netting was nailed; this was trowelled over with cement. In Western Nebraska we have seen farmers building cement houses and the practice is to be commended and called to the attention of others as giving rapid, cheap and excellent results with home labor. A trench about one foot deep is dug around for the foundation. This is filled level full with concrete, then boards are set up all around and another course of cement poured in. As soon as this sets sufficiently the boards are raised, and another course is laid, and so on. This makes a warm, sensible house, and by using a little taste it is not without beauty.

In laying cement walks in cities, where it is done with care so as to insure satisfactory results, it will be noticed that the workmen are careful to cover

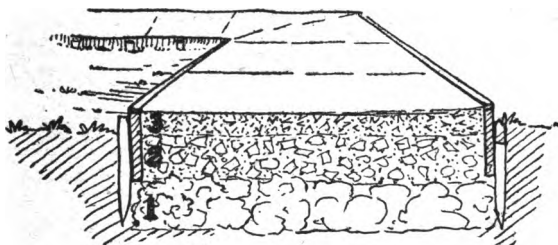


FIG. 14

A cement walk, with boards staked in position.

1 coarse cinders and rock.

2, coarse concrete and cement,

3, top-dressing of fine concrete, sand and cement

Walks may be slightly raised or may be on a level with the sod

the freshly laid cement with moist sand to prevent rapid drying. It is well for amateurs to take a hint from the experienced, and use means to prevent drying. The question naturally arises, where do we get our cement, and in reply it may be said briefly, that part of it comes from abroad, and part of it is made at home. It is produced in our neighboring states, but not in Nebraska. This is the more unfortunate, since we have the cement rock in great abundance and desire to have new industries established.

If there is any problem connected with the manufacture of cement it is that of fuel alone. The demand for cement is here, the rock is here, the demand is increasing and all that seems of special concern is the cost of fuel, and since our shipping facilities are better than some of the places around us where cement is produced, it is probable that we can compete with any of the other states in its production.

Cement rock may be spoken of as an impure limestone. If the limestone lacks anything it can be added artificially. Thus in the cement rock which is so extensively exposed in Nebraska in the Niobrara formation, the light colored chalk is mixed with a certain proportion of the neighboring black shale. This mixture burned and ground is ready for shipment. The

process of manufacture is a rather simple one, and we can confidently look forward to the establishment of cement works in this state.

Table showing the progress of the Portland cement industry in the United States for one decade.

Number of cement works:

	1890	1894	1899	1900	1901
	16	24	36	50	56
Barrels of cement produced:					
	1890	1894	1899	1900	1901
	335,500	798,757	5,652,266	8,482,020	12,711,225
Value. ....			\$8,074,371	\$9,280,525	\$12,532,360

Note the rapid rate of increase in the production of this building material and its decrease in cost to the consumer. The average rate of increase in

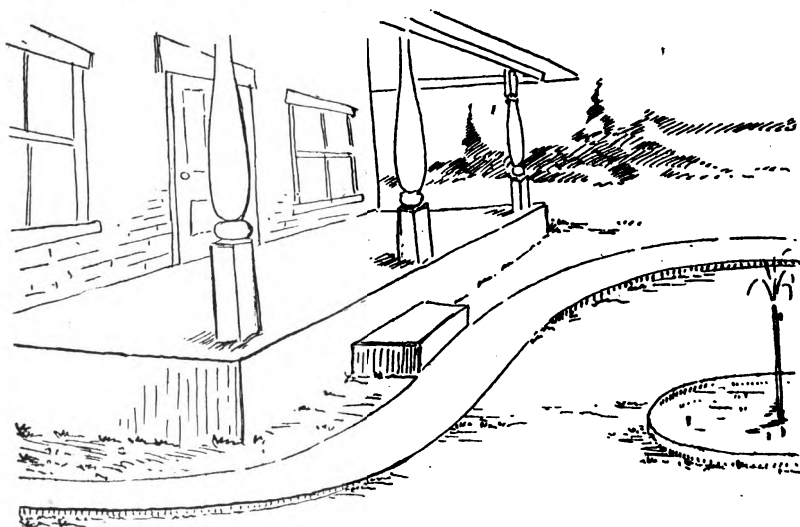


FIG. 15

Sketch of a farm house, with winding front and back walk, porch floor and step, and small fountain and fish-pond, all built of hydraulic cement

the production of cement in the United States from year to year is more than 40%, an enormous growth. Sometimes the amount produced is doubled in two years.

An item of great moment to many consumers of cement is the fact that the price has fallen from several dollars per barrel to about one dollar. This is about one-half the price of the imported cement. It should be mentioned that we import over two million barrels of cement a year to meet the demand.

Do not forget that the American cements have the stamp and seal of approval of the best engineers and of the United States Geological Survey. Our domestic cements are counted superior to the best imported grades.

## HOW TO MIX HYDRAULIC CEMENT FOR USE ON THE FARM.

Not having practical experience the writer must touch guardedly on the matter of mixing cement for use on the farm. It is advisable to consult some practical cement worker in one's nearest town or city. If one observes he will see that it is common practice in our cities and larger towns where increasing stretches of cement sidewalks are being laid, to first put a course of coarse cinders or rock well pounded down, next above this is laid a coarse concrete 3 to 4 inches, made as follows, according to rules furnished by one of the best companies of Lincoln. Mix one barrow of sand, two barrows of concrete (rock broken to about the size of walnuts) and one-half sack of cement; upon this course is laid the top dressing, or finishing coat; mixed as follows. Two barrows of granite chips (hard rock broken to about the fineness of shelled corn); one barrow of sand, and two sacks of good cement, level to edge of side boards and smooth as much as desired, and mark off into blocks by drawing lines while the cement is soft. Cover the walk with damp sand and let set for a few days.

It is doubtful if any form of walk is as satisfactory, lasting and economic, hence it is to be recommended to all farmers and ranchmen. No matter how distant from market, one may have by self help the luxury of good walks, curbs, cellar floors and steps, by using a few bags of good hydraulic cement.



A  
PRELIMINARY REVIEW  
OF THE  
BIRDS OF NEBRASKA  
WITH SYNOPSES

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BY  
LAWRENCE BRUNER      ROBERT H. WOLCOTT  
MYRON H. SWENK



## INTRODUCTION

In 1896, Prof. Bruner published his list entitled "Some Notes on Nebraska Birds." As a working basis for the study of the ornithology of the state it has proven invaluable and it has also been greatly in demand by people not ornithologists, who desired to "know something about our birds." That edition was exhausted some time ago and its author has been frequently urged to publish another. However, the organization of the Nebraska Ornithologists' Union and the development of ornithology in the University has led to such a rapid increase in our knowledge in the past five years that it seemed that any publication would soon become out of date, and so no one ventured to undertake the task.

It is under these conditions that the opportunity has been offered, through the kindness of Ex-Governor Furnas, Secretary of the State Board of Agriculture and an enthusiastic member of the Union, to prepare something on the birds of the state. It seemed too good an opportunity to be lost, and yet, under the circumstances, the authors of this contribution feel that it can only be considered, as its title states, as a preliminary review.

It should be understood, nevertheless, preliminary in one sense as it is, that it has been prepared with the greatest care, and is believed to represent exactly the state of our knowledge at the present day. Every species has been carefully considered, the specimens available examined, its occurrence in surrounding states studied, the records in Bruner's list thoroughly canvassed, as well as all data which have accumulated since, and the whole reduced to such statements as indicate clearly the limits of our knowledge in regard to the form under consideration. All specimens about which there could be any doubt were sent to authorities east for exact determination. Those species that have been previously reported from Nebraska but the right of which to a place in our fauna is questioned or denied have been introduced, but in brackets. There have also been added under the phrase "extralimital" those species which may possibly be found in the state in the future.

This introduction of extralimital forms and their inclusion in the synopses has been thought desirable for the reason that many of them are almost sure to be found sooner or later, and this calling attention to them may result in their earlier detection and addition to our list. The aim has been to prepare a work which should not only reflect the present state of our knowledge, but at the same time be a new basis for future work. For the same reason all species which are known definitely to have bred within our limits are marked with an asterisk. It will be evident to the reader that the addition of the figures showing the details of bird structure and the article on Birds in relation to Agriculture and Horticulture, as well as of the synopses themselves, is in order that the paper may be useful to any one, whether an ornithologist or not, and may be the means of further increasing



the interest in birds and love for them, in the state, and so advancing the cause of bird protection. It is not expected, however, that it will be sufficient for the student of ornithology, who should possess beside some good manual with full descriptions and figures of our birds, such as Apgar's *Birds of the Eastern United States*, Chapman & Reed's *Color Key to North American Birds*, or if he can afford a more expensive work, either Ridgway's *Manual* or Coues' *Key*. Some day this preliminary review may be expanded into a complete, illustrated work on Nebraska birds, but it remains for the generosity of the state legislature or of some state society, interested in their preservation, to say when that shall be.

The numbers preceding each species are those of the American Ornithologists' Union check list, and in regard to nomenclature the same list has been followed implicitly; the possessive has however been omitted from the common names.

The authors desire to acknowledge the assistance received, in the way of data, from various members of the Union and local bird club, whose names appear in connection with the records under different species, and also to recognize their indebtedness to Apgar's *Birds of the Eastern United States*, the keys in which have formed the basis for some of the synopses here used.

The thanks of the authors are also here extended to those of our ornithological authorities who have generously determined specimens sent to them—Messrs. H. C. Oberholser of the U. S. Biological Survey and Witmer Stone of the Philadelphia Academy of Natural Sciences.

In the working over of records and material and in the comparison of authorities all the authors have participated, but a large part of the clerical work and of the preparation of the synopses has been done by Mr. Swenk.

## BIRDS IN RELATION TO AGRICULTURE AND HORTICULTURE\*

BY LAWRENCE BRUNER

Nebraska is a good home for birds. We know definitely as many as four hundred different kinds that have been found within our borders and the presence of 11 more is quite probable. Of these two hundred are definitely known to nest in the state; many more certainly should be added to the list. During winter months more than one hundred (120) have been recorded, while the others leave in the fall for the warmer south country, only to return to us with the advent of pleasant weather in the following spring. While there is much to be learned concerning the migrations, nesting, moulting, songs and peculiar ways of living among the different birds that we may see in our groves, fields, along the streams, on the prairies, and about the hedge rows and garden patches, the most important feature connected with their lives to us is their food habits. For it is by what they eat that birds can and do make themselves of so much value to us. Of course birds are of different colors, sizes, and forms, and have their beaks, feet, wings, and tails made so as to best conform to the uses for which they are intended. The woodpeckers have hard, chisel-like beaks for cutting holes in the bark and wood, and, at the same time, their tail feathers are stiff and pointed so as to be of use as props for holding the birds in place while busily engaged at nest making or digging for borers. In a like manner their long tongues are barbed so as to spear and drag forth the "worms" when reached. The short, strong beaks of the sparrows and their relatives are likewise suited for cracking the many kinds of weed seeds eaten by these birds in winter, as well as for crushing such insects as are eaten by the parents or fed to their young during the summer time.

On account of this most important feature in connection with our birds, we will confine our remarks in this paper chiefly to what they eat, and leave the descriptions of the birds themselves, their haunts, migrations, and nest building for some other time. Then too, almost everybody knows a few of these last mentioned things about most of our common birds.

Birds can be useful to us in many ways. They can carry the seeds of different plants from one place to another so as to help start new groves in which we and our domestic animals may find shelter from the cold winds of winter and the oppressive heat in summer. They plant seeds of shrubs by the way-

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\*The present chapter is a combination of two former papers by the author, on the same topic, but the subject matter has been somewhat modified and abridged. The first of these papers appeared in the Proceedings of the Nebraska Ornithologists' Union, II, pp. 18-29, and the second in the New Elementary Agriculture, pp. 103-117. This last work was issued by the University Publishing Company of Lincoln, Nebr.

side that spring up either to give shade or later to bear good fruit. They also carry the spawn of fishes and small crustaceans among their feathers into new waters, and feed upon the countless millions of weed seeds that are scattered broadcast over our fields, meadows, pastures, and prairies. Some kinds live almost entirely upon insects; while others hunt out and destroy such small animals as mice, ground squirrels, and gophers. Still others, like some of the useful insects, act as scavengers by helping to remove decaying things that would make us sick if not cleared away.

In addition to these direct benefits which we derive from the birds, we are further indebted to them for the cheer which their gay music, bright plumage, and pleasant manners bring to us. The birds form a carefully planned army of police, which is engaged in keeping things in nature about us balanced.

But we can go even further when summing up the benefits that human beings derive from birds. A great many kinds provide us with excellent food, while others furnish downy feathers for making soft pillows upon which to rest our weary heads and warm coverlets for use upon our beds during the long cold winters.

Everybody knows that birds sometimes also do harm. It is therefore our duty to learn just what this is and whether or not it is as great as some people try to make us believe. Quite a number of different kinds of birds are continually doing things that we call wrong. If we only know of these wrongs and nothing of the good things which they do it might go pretty hard with our feathered neighbors.

Some of the wrongs that are perpetrated by birds, or at least which are credited to them, are such as cherry stealing, grain eating, grape puncturing, apple pecking, corn pulling, the carrying of various kinds of bark and other plant lice on their legs and feet from place to place, the spreading of hog cholera by crows and turkey buzzards, the robbing of eggs and young birds from nests and even the poultry yard.

Some of these so-called crimes are genuine and are to be regretted. Others are more imaginary than real. A few of them could be prevented in part or altogether, while others might be made less severe, if we were inclined to take the trouble to do it. After all that can be said in favor of and against the usefulness of birds in general, there can be but little doubt left in the minds of thinking and observing people as to the value of these creatures. Only ignorant and thoughtless persons will continue to destroy our birds indiscriminately after learning the actual facts about them.

So varied is the task of "evening up" in nature spoken of above, that if attended to in the right way, the workers should be many and necessarily have widely different habits. That such really is the case, can easily be seen from a perusal of the following short account of the food habits of some of the different groups of our Nebraska birds:

Grebes and loons feed chiefly on snails and other water animals such as are found about ponds, lakes, and rivers. They also destroy grasshoppers and other destructive insects when these latter are found about their haunts.

The gulls, with their long wings and great powers of flight, often reach far inland in their journeys. Whenever they do they catch large numbers of

grasshoppers, crickets, June-beetles, and other common insects. Four or five kinds of these birds breed in our state in large numbers every summer, and may frequently be seen following the farmer as his plow turns up the juicy but destructive grubs.

The ducks and geese, like their tame relatives, are also very fond of insects, which they catch about the margins of ponds and lakes near which they build their nests and raise their young. Even such birds as the bitterns and other herons kill many insects in addition to the snails, fishes, frogs, and other small animals which in part make up their bill of fare.

The different kinds of snipes and their relatives are also great destroyers of insects. Moving over the landscape, as many of them do, in large flocks which spread out over the meadows, pastures, hillsides, and fields, they perform a large amount of systematic police service in discovering and arresting the rascals among insects. They even pry them out of the cracks and holes in the ground where they have crawled and are hiding during the daytime. This they are enabled to do on account of the long, slender bills with which they are provided.

The Prairie Chicken and Sharp-tailed Grouse, as well as the Quail or "Bob-white," all feed almost entirely on insects during the summer. They also eat large numbers of these creatures during the remainder of the year whenever they can get them. The Quail especially is to be considered one of our very best insect destroyers, since it eats both the Colorado potato beetle and the chinch-bug. Perhaps no other bird on the farm pays higher prices for the little grain it gets than does the Quail. Living about hedge-rows, groves, and in ravines, where insects gather and lurk during the greater part of the year, this bird discovers and devours large numbers of these enemies daily. Not only during the summer months when these vermin are moving about, but all winter, too, it scratches among the fallen leaves, and other rubbish seeking for hibernating insects of various kinds. Being a timid bird it seldom leaves cover to feed openly in the fields, and therefore does little real harm in the way of destroying grain.

Even the barnyard fowls do much in the way of destroying many different kinds of insects throughout the summer months. Where fields of grain can be gone over systematically by chickens, turkeys, guinea hens, and ducks, little or no damage is done by grasshoppers, cut-worms, and other similar pests, unless, of course, these insects are too numerous to be eaten by them.

Ordinarily doves and pigeons are not considered harmful, yet they eat but few insects. But, on the other hand, many weed seeds, as sunflower, ragweed, foxtail, etc., are eaten by them. Perhaps, all told, the good done by them during the year will greatly overbalance the harm caused by their visits to the grain fields and feed lots.

During recent years, since we began studying more carefully just what our various kinds of birds have been eating, it has been learned that many of those which we heretofore called rascals should really be considered as friends. Hawks and owls, all of which were killed on sight by nearly every man or boy who could shoot, are now spared, except when caught in the very act of stealing chickens. This change is due to the fact that we now know that

they feed mostly on mice, squirrels, gophers, prairie dogs, and rabbits, as well as on many harmful kinds of insects.

Our Yellow-billed and Black-billed Cuckoos feed chiefly on hairy caterpillars and several other kinds of insects which they find lurking among the leaves of trees. Although considered among our shyer species, they even come about our houses and venture into towns and cities for their favorite insect food.

There are few persons who will not admit that the woodpeckers as a family are very useful birds. Feeding as they do, on the young of wood-boring insects, they can do more relative good for the number of insects destroyed than if they feed on such kinds as attack the leaves. A single borer left undisturbed might kill a tree, while hundreds of leaf eaters of the same size would scarcely be noticed if warning of their presence depended on the effect their feeding had upon the appearance of the same tree. The commonest kinds of woodpeckers in Nebraska are the Flicker, Red-headed, Downy, and Hairy, all of which are often seen about our groves and orchards, where they carefully hunt for borers and other harmful insects.

Birds like the Whippoorwill, Nighthawk, and Chimney Swift eat nothing but insects such as they catch in the air while flying about. The first two are night fliers, while the other is one of our birds that flies and feeds during daytime.

The family to which the King-bird or Bee-bird belongs is also one that is made up of insect eaters. They catch such kinds as flies, butterflies, moths, beetles, and grasshoppers. The few bees eaten by the Bee-bird should not count against the other members of the family, nor should we blame even the bee-killer himself too much for the occasional rascal of his kind that prefers to sit near a hive and catch drones and, rarely, a worker.

Crows and their relatives, the magpies and jays, are sometimes called rascals. Perhaps there is good reason in a number of cases for giving these birds so bad a name; but we must not judge them too hastily, for sometimes there are good deeds done even by the greatest of rascals. After finding out what these deeds are, good and bad, we may think that enough good has been done to at least give the "rascal" another chance. All of these birds eat more insects, bulk for bulk, than they do of any other substance. The Blue Jay does much of the mischief for which we blame the Robin, orioles, and thrushes, and then sneaks away like a thief. He also robs the nests of our smaller and weaker birds at times. To partly offset these mean traits he destroys large numbers of injurious insects.

The meadowlarks, orioles, and blackbirds are the most important destroyers of such insect-pests as attack field crops. They remain with us during the whole year save for only a few months in the winter; gathering in large flocks, as several kinds do, they can wipe out an insect plague in a short time. The large flocks of red-winged blackbirds which visit our cornfields do so to secure the destructive ear-worm which abounds at that time of the year, and not for the corn, as many of us suppose. Don't kill any of these useful birds, because they more than pay for the vegetable food which they eat.

Our sparrows and their relatives of the family Fringillidae form a very ex-

tensive group of highly useful, as well as beautiful, birds. They spend most of their time during the summer months when not actually occupied with nest building and rearing their young, in hunting for and destroying different kinds of insects. But this is not all the good they do. In fall, winter, and early spring, when Mother Earth has lost her beautiful green dress and is clothed instead in somber browns and wrapped in a mantle of snow and ice, the longspurs, snowbuntings, snowbirds and some of the sparrows that have remained with us, are busily engaged in gathering for themselves a living. They hop and fly about from place to place hunting for and picking up little seeds of grasses, weeds, shrubs, and trees with which to feed themselves and keep alive until the warm weather of spring returns and brings back to them the abundant supply of nourishing insects of which they are so fond. Even during this busy cold season, they chirrup merrily as they work, so satisfied are they with the kind of life they are living. The English, or European House-sparrow, has the worst reputation of the entire family. But even this bird has some good traits which tend to secure for it our friendship.

The swallows, as we all know, are insect destroyers; and, seizing their prey as they fly, they naturally take such forms among these pests as flies, gnats, and mosquitoes—our worst personal enemies. We should by all means encourage these birds to build their nests in our barns and sheds in order that they may pay rent by destroying the various flies that attack and worry ourselves and our domestic animals.

The shrikes or butcher-birds are genuine brigands or pirates when it comes to killing other forms of life. They are true to their name, and butcher large numbers of insects, mice, lizards, small snakes, and even occasionally a few of the smaller birds. They take their prey to some thorn bush or barbed wire fence and impale the victims for future use or to dry up and blow away. The good they do will more than outweigh the harm which they inflict.

The vireos or greenlets, as they are commonly called, which frequent thickets and hedgerows, live almost entirely upon an insect diet. Their food is composed chiefly of little caterpillars and grubs picked from the leaves of small trees and shrubs which form the shelter in which they make their homes. They are not entirely averse to eating some of the hairy forms, and in this respect aid the cuckoos mentioned in a preceding paragraph.

The warblers are insect destroyers. Brightly-colored, active creatures as they are, they fill a gap in nature which would be empty without them. They fit about the terminal twigs and leaves of our trees and shrubs where they detect and capture many of our smaller, but at the same time very dangerous, insect pests. Plant-lice and the smaller caterpillars are at times quite prominent in their bill of fare.

Much could be written about birds like the wrens, the Mockingbird, and the Catbird, but they are too well known in one way or another to make it necessary to spend time or space here for the purpose of introducing them anew. Suffice it to say, that they more than pay for what they eat by killing off some of the decidedly harmful insects. Then, too, they are to be numbered among the most beautiful singers of the feathered choir, which latter fact in itself fully offsets the harm done by them in the way of fruit eating.

The nuthatches, titmice, and others of our winter and early spring birds are too well known as friends to make it necessary here to even hint at their usefulness. The eggs of many hibernating insects are quite prominent among the things eaten by them throughout the season when the trees are bare and bird food is scarce.

The Robin and the Bluebird need no introduction even to our boys and girls. We all know them only to wish that their numbers could be greatly increased. The former as it hops over the grass-covered lawn in search of cut-worms, is engaged in its chief occupation. Seventeen quarts of caterpillars, it is claimed, is the average number of such insects destroyed by each robin annually; and of this quantity about one-half or more are cut-worms. We need not stop to ask whether or not the destruction of these will pay for the cherries and berries eaten.

Summing up the work of our birds as relates to their destruction of insects, it can be briefly stated as follows:

"In the air swallows and swifts are coursing rapidly to and fro, ever in pursuit of the insects which constitute their sole food. When they retire, the night-hawks and whippoorwills take up the chase, catching moths and other nocturnal insects which would escape the dayflying birds. Flycatchers lie in wait, darting from ambush at passing prey, and with a suggestive click of the bill returning to their post. The warblers, light, active creatures, flutter about the terminal foliage, and with almost the skill of a humming-bird, pick insects from leaf or blossom. The vireos patiently explore the under sides of leaves and odd nooks and corners to see that no skulker escapes. The woodpeckers, nuthatches, and creepers attend to the trunks and limbs, examining carefully each inch of bark for insects' eggs and larvae, or excavating for the ants and borers they hear within. On the ground the hunt is continued by the thrushes, sparrows, and other birds that feed on the innumerable forms of terrestrial insects. Few places in which insects exist are neglected; even some species which pass their entire lives in the water are preyed upon by aquatic birds."\*

In nearly every case where the food habits of our birds have been carefully studied, do we find that the good done far exceeds the possible harm that might be inflicted by our birds. Allowing twenty-five insects per day as an average diet for each individual bird, and estimating that we have about one and one-half birds to the acre, or in round numbers 75,000,000 birds in Nebraska, there would be required 1,875,000,000 insects for each day's rations.

Again estimating the number of insects required to fill a bushel at 120,000, it would take 15,625 bushels of insects to feed our birds for a single day, or 2,343,750 bushels for 150 days. These estimates are very low when we take into account the numbers of insects that various kinds of our birds have been known to destroy in a single day. For example, the stomach of four chickadees contained 1,028 eggs of cankerworms. Four others contained about 600 eggs and 105 mature females of this same insect. The stomach

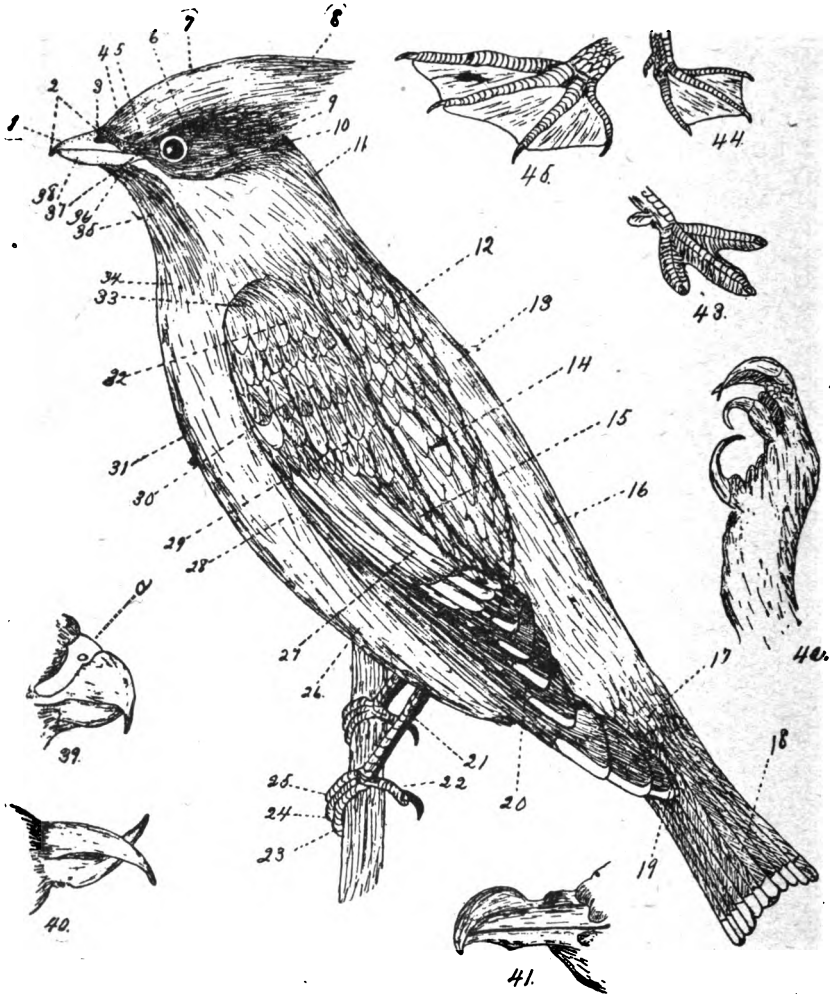
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\*Frank M. Chapman in *Bird Life*—D. Appleton & Co.

of a single Bob-white contained 101 potato-beetles; and that of another upwards of 500 chinch-bugs. A yellow-billed cuckoo shot at six in the morning contained forty-three tent caterpillars. A robin had eaten 175 larvae of *Bibio*, which feed upon the roots of grasses, etc.

Birds, like all other animals, feed upon that food which is most readily obtained, hence the insectivorous kinds destroy those insects which are the most numerous—the injurious species; and likewise the seed-eaters subsist largely upon the seeds of our weeds.





### TOPOGRAPHY OF BOHEMIAN WAXWING FOR BEGINNERS

- |                        |                               |
|------------------------|-------------------------------|
| 1 Upper mandible.      | 9 Occiput.                    |
| 2 Culmen.              | 10 Auriculars or ear-coverts. |
| 3 Nostril.             | 11 Nape.                      |
| 4 Forehead.            | 12 Interseapular region.      |
| 5 Lores.               | 13 Back.                      |
| 6 Superciliary stripe. | 14 Scapulars.                 |
| 7 Crown.               | 15 Tertials.                  |
| 8 Crest.               | 16 Rump.                      |

- |                        |                          |
|------------------------|--------------------------|
| 17 Upper tail-coverts. | 29 Greater wing-coverts. |
| 18 Tail feathers.      | 30 Middle wing-coverts.  |
| 19 First primary.      | 31 Breast.               |
| 20 Primaries.          | 32 Lesser wing-coverts.  |
| 21 Tarsus.             | 33 Carpal joint.         |
| 22 Hind toe.           | 34 Jugulum.              |
| 23 Outer toe.          | 35 Throat.               |
| 24 Middle toe.         | 36 Chin.                 |
| 25 Inner toe.          | 37 Gape.                 |
| 26 Abdomen or belly.   | 38 Lower mandible.       |
| 27 Secondaries.        | 39a Cere on bill.        |
| 28 Side.               |                          |

#### TYPES OF BILLS AND FEET

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| 39 Strongly hooked bill of hawk.      | 43 Lobate foot of Pied-billed Grebe. |
| 40 Falcate bill of Mexican Crossbill. | 44 Palmate foot of duck.             |
| 41 Tubular nostril of Fulmar Petrel.  | 45 Totipalmate foot of cormorant.    |
| 42 Raptorial foot of Long-eared Owl.  |                                      |

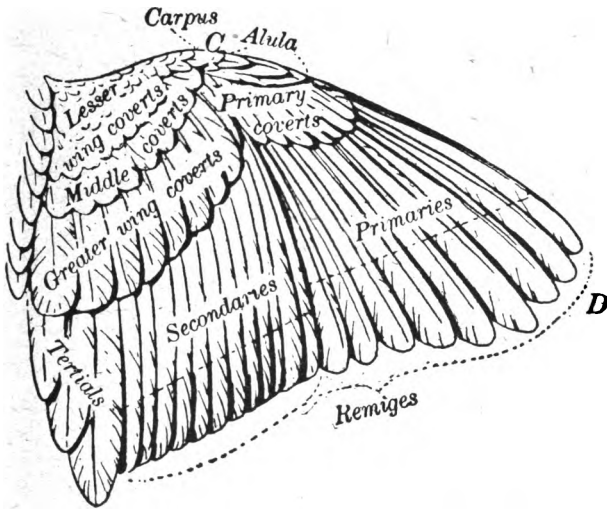


DIAGRAM SHOWING THE VARIOUS FEATHER TRACTS ON THE WING OF A BIRD  
(FROM CORY'S BIRDS OF EASTERN NORTH AMERICA)



## SYNOPSIS AND LIST

## THE ORDERS OF NEBRASKA BIRDS

1. Hind toe connected by web with inner front toe. . . . . III. *Steganopodes*.
1. Hind toe, if present, not connected with inner front toe. . . . . (2)
  2. Cutting edges of bill more or less fringed or serrated. . IV. *Anseres*.
  2. Cutting edges of bill not fringed or serrated. . . . . (3)
3. Legs inserted in the rear of the body; toes webbed or lobed. I. *Pygopodes*.
3. Legs inserted near middle of body, or else toes not webbed. . . . . (4)
  4. Front toes distinctly webbed, and tarsus shorter than tail. . . . . II. *Longipennes*.
  4. Front toes not distinctly webbed, or else tarsus longer than tail. (5)
5. Tibia more or less naked below; waders. . . . . (6)
5. Tibia entirely feathered; not waders. . . . . (8)
  6. Hind toe long and on the same level as the others; lores naked. . . . . V. *Herodiones*.
  6. Hind toe, if present, small and elevated; lores feathered. . . . . (7)
7. If more than 3 feet long, hind toe elevated; if less, on the same level. . . . . VI. *Paludicolæ*.
7. Never more than three feet long, hind toe, if present, elevated. . . . . VII. *Limicolæ*.
  8. Bill strongly hooked, and with distinct naked cere at base. . . . . (9)
  8. Bill not both strongly hooked and cered; or if cered the bill straight. . . . . (10)
9. Toes 3 in front, the outer toe sometimes reversible. . . X. *Raptores*.
9. Toes 2 in front, 2 behind. . . . . XI. *Psittaci*.
  10. Hind toe short, decidedly elevated. . . . . VIII. *Gallinæ*.
  10. Hind toe but very slightly elevated, if at all. . . . . (11)
11. Bill with a soft swollen cere. . . . . IX. *Columbæ*.
11. Bill without a cere. . . . . (12)
  12. Wing very long, tail feathers 10, gape very wide and deeply cleft; or else bill long and slender and secondaries 6. . XIV. *Macrochires*.
  12. Wing not very long and gape not wide or deeply cleft; or else tail feathers 12. . . . . (13)
13. Toes 2 in front, or if 3, middle and outer toes connected for one-half their lengths. . . . . (14)
13. Toes 3 in front, middle and outer ones not connected for one-half their lengths. . . . . XV. *Passeres*.
  14. Tail feathers stiff and pointed. . . . . XIII. *Pici*.
  14. Tail feathers not stiff, nor pointed. . . . . XII. *Coccyges*.

## ORDER I. PYGOPODES—DIVING BIRDS

- A. Feet lobed but not webbed. . . . . **Podicipidæ.**  
 A. Feet webbed. . . . . **Gaviidæ.**

## FAMILY PODICIPIDÆ—GREBES

1. Bill longer than head (3 inches), five times as long as deep, slender, acute, straight; size very large; neck very long; above slaty, crown and hind neck black, elsewhere pure white. . . . . **Western Grebe.**
1. Bill shorter than head (1 inch), less than twice as long as deep, very stout, compressed sideways, hooked at tip; size small; in summer throat and band on bill black. . . . . **Pied-billed Grebe.**
1. Bill equal to or shorter than head (1 to 2½ inches), less than four times as long as deep, stoutish, straight; size small to large; neck moderate; in summer head crested. . . . . (2)
  2. Wing about 7½ inches; bill about as long as head; sides of neck rufous in adult. . . . . **Holboëll Grebe.**
  2. Wing 5 to 6 inches; bill shorter than head. . . . . (3)
3. Bill compressed, higher than broad at base; neck red in front in summer . . . . . **Horned Grebe.**
3. Bill depressed, broader than high at base; neck black in front in summer. . . . . **Eared Grebe**

1. *Æchmophorus occidentalis* (Lawrence)—WESTERN GREBE.

A straggler from the west, breeding from North Dakota and Manitoba northwards. Recorded twice from Nebraska, once from Cut-off lake, near Omaha by L. Skow, and again from Curtis, where Rees Heaton has taken a specimen.

2. *Colymbus holboëllii* (Reinhardt)—HOLBOËLL GREBE.

A northern grebe, breeding locally north of the United States, but occasionally reaching the latitude of southern Nebraska in late fall and winter. A specimen was taken at Alda by F. W. Powell, and another shot at Curtis is now in the Rees Heaton collection at that place.

3. \**Colymbus auritus* Linnaeus—HORNED GREBE.

Rather a rare migrant and breeder. Recorded migrating at West Point, Ravenna, and Lincoln. Found breeding in the alkali lakes of northern Cherry county by I. S. Trostler, and a pair, with newly made nest, noted at Little Alkali lake, in the same region, June 6, 1903, by Wolcott.

4. \**Colymbus nigricollis californicus* (Heerman)—EARED GREBE.

A common migrant throughout the state, breeding in abundance in the lake region of Cherry county. Also found breeding in small num-

bers at West Point and Omaha. Arrives in spring about the end of April; departs by the end of September.

6. **\*Podilymbus podiceps** (Linnaeus)—PIED-BILLED GREBE.

An abundant migrant, and a common breeder in suitable localities throughout the state. Arrives about the middle of April and lingers till October.

FAMILY GAVIIDÆ—LOONS

1. Back black or blackish, distinctly spotted with white. . . . . (2)

1. Back blackish, not spotted with white, but the feathers gray tipped. . (3)

2. Throat whitish, in summer foreneck with chestnut. . . . .

Red-throated Loon.

2. Throat black, sides of neck with white streaks and no chestnut (3)

3. Wing 13 to 15 inches long; crown black in summer. . . . . Loon.

3. Wing 11 to 13 inches long; crown ashy in summer. . Black-throated Loon.

7. **Gavia imber** (Gunnison)—LOON.

A not common migrant, breeding from northern United States northward. Numerous records; Omaha, Lincoln, West Point, Rockport, Curtis, etc. Seen early in spring and late in fall.

9. **Gavia arcticus** (Linnaeus)—BLACK-THROATED LOON.

A bird of the arctic regions wintering south to the northern states. One Nebraska record, a fine male, in the Rees Heaton collection, having been taken at Curtis.

11. **Gavia lumme** (Gunnison)—RED-THROATED LOON.

Also an Arctic bird, found in the northern states in winter. Two records, a specimen being taken on the Missouri near Omaha, Sept. 28, 1894, and another April 6, 1897, both males and both reported by I. S. Trostler.

ORDER II. LONGIPENNES—LONG-WINGED SWIMMERS

- A. Upper mandible of three pieces, a hook, lateral piece, and cere. . . .

Stercoraridæ.

- A. Upper mandible of one piece. . . . . Laridæ.

FAMILY STERCORARIDÆ—JAEGERS

1. Middle pair of tail feathers rounded; wing  $13\frac{1}{2}$  and culmen over  $1\frac{1}{2}$  inches long. . . . . Pomarine Jaeger.

1. Middle pair of tail feathers acute, wing under  $13\frac{1}{2}$  and culmen under  $1\frac{1}{2}$  inches long. . . . . (2)

2. Cere more than half as long as culmen; adult with tail about  $8\frac{1}{2}$  inches long. . . . . Parasitic Jaeger.

2. Cere less than half as long as culmen; adult with tail 11 to 15 inches long. . . . . Long-tailed Jaeger.

36. **Stercorarius pomarinus** (Temminck)—POMARINE JAEGER.

A rare migrant, breeding far north. Aughey saw it once on the

Missouri river, in Dakota county, in May, 1869, and a specimen was sent to him, shot on the Platte river near Fremont, in May, 1873. A third record is from M. K. Barnum, of one shot at North Platte, Nov. 11, 1895.

37. *Stercorarius parasiticus* (Linnaeus)—PARASITIC JAEGER.

A rare migrant. One record for Nebraska, a specimen having been shot by August Eiche on Salt lake near Lincoln, Sept. 13, 1898, and now in his collection.

EXTRALIMITAL: The third member of this genus in North America, 38. *S. longicaudus* Vieillot, the Long-tailed Jaeger, also rarely migrates through the interior, but has not been taken in Nebraska as yet.

FAMILY LARIDÆ—GULLS AND TERNS

1. Bill with upper mandible strongly curved and hooked at tip, directed forward in flight; tail generally even at tip, rarely slightly forked; voice hoarse; (Subfamily Larinæ—Gulls)..... (2)
1. Bill with upper mandible slightly and evenly curved throughout, sharply pointed and not hooked at tip, pointed downward in flight; tail forked, generally deeply so; voice shrill; (Subfamily Sterninæ—Terns).... (11)
  2. Plumage without black, even on the primaries..... (3)
  2. Plumage with more or less black, at least on the primaries..... (4)
3. Bill over 2 inches long and wing over 16½ inches long. . . . . Glaucous Gull.
3. Bill under 2 inches long and wing under 16½ inches long. . . . . Iceland Gull.
  4. Hind toe very minute and without a nail; head mostly white. . . . . Kittiwake.
  4. Hind toe well formed and with a nail. . . . . (5)
5. Tail forked for about an inch; primaries largely black, 2 to 4 white-tipped. . . . . Sabine Gull.
5. Tail not at all forked. . . . . (6)
  6. Large, wing 14 to 19 inches long; head, tail, and under parts white in summer adult. . . . . (7)
  6. Small, wing 10 to 13 inches long; head black in summer adult (9)
7. Back and wings slaty black in adult, brownish in young; wing over 17½ inches. . . . . Great Black-backed Gull.
7. Back and wings pearl gray in adult; wing under 17½ inches long. . . . . (8)
  8. Wing about 17 inches; feet flesh-colored; bill chrome yellow; young mottled. . . . . Herring Gull.
  8. Wing about 16½ inches; feet yellowish; bill with a red spot below. . . . . California Gull.
  8. Wing about 15 inches; feet yellowish; bill banded with black near tip. . . . . Ring-billed Gull.
9. Outer primary wholly black; wing over 12 inches; bill reddish in summer. . . . . Laughing Gull.
9. Outer primary with white in adult; wing under 12 inches. . . . . (10)
  10. Tip of outer primary white in adult; bill red; wing about 11 inches. . . . . Franklin Gull.

10. Tip of outer primary black in adult; bill black; wing about 10 inches. . . . . **Bonaparte Gull.**
11. Back, wings, and tail slaty; in summer head and under parts black, in winter white. . . . . **Black Tern.**
11. Back and wings pearl gray, crown more or less black. . . . . (12)
  12. Small, wing about  $6\frac{1}{2}$  inches; forehead white, crown and line through eye black, bill yellow in summer. . . . . **Least Tern.**
  12. Medium, wing  $9\frac{1}{2}$  to  $11\frac{1}{2}$  inches; crown wholly black, bill red in summer. . . . . (13)
    12. Large, wing 14 to 17 inches; crown wholly black, bill orange (15)
13. Inner web of outer tail feather gray, outer web white; under parts pure white. . . . . **Forster Tern.**
13. Inner web of outer tail feather white, outer web gray; under parts grayish. . . . . (14)
  14. Bill red, tipped with black; tarsus over  $\frac{7}{16}$  inch; tail one-half length of wing. . . . . **Common Tern.**
  14. Bill wholly red; tarsus under  $\frac{7}{16}$  inch; tail two-thirds length of wing. . . . . **Arctic Tern.**
15. Primaries wholly blackish, silvery on outer web; tailless forked; larger. . . . . **Caspian Tern.**
15. Primaries with inner two-thirds of inner web, except tip, white, the tip and outer web frosty black. . . . . **Royal Tern.**

47. **Larus marinus** Linnaeus—**GREAT BLACK-BACKED GULL.**

The only Nebraska record for this bird is Aughey's, he having examined a dead specimen which some Winnebago Indians had shot on the Missouri and brought to Dakota City in May, 1871. He states that this was the only instance of its occurrence in Nebraska known to him. Some doubt has been expressed as to the acceptability of this record, but the bird winters regularly to the Great Lakes, and is so well-marked in adult plumage by its slaty mantle and even in the young by its very large size, that misidentification is hardly possible.

51. **Larus argentatus** Bruennich—**HERRING GULL.**

A rather rare migrant. Aughey records two specimens, procured from the Winnebago Indians in May, 1870. Since then other observers have recorded it from West Point, Lincoln, Omaha, Rockport, Gresham, and Beatrice. Breeds from northern states northward.

54. **Larus delewarensis** Ord—**RING-BILLED GULL.**

A common migrant. There is a strong probability of this bird breeding in northern Nebraska, especially about the Cherry county lakes, where J. M. Bates, J. S. Hunter, R. H. Wolcott, J. E. Wallace, and F. H. Shoemaker have, in several different seasons, found it to be common throughout the summer, but as yet no one has found a nest. Also recorded in July from along the Niobrara and Elkhorn rivers. Appears in spring about April 1, and lingers in fall to October.



58. *Larus atricilla* Linnaeus—LAUGHING GULL.

A rare summer visitant, straggling up the Mississippi valley from the Gulf coast, where it breeds. Recorded by F. W. Powell, from Alda, in July, 1880, and by L. Skow, from Omaha.

59. *Larus franklinii* Swainson and Richardson—FRANKLIN GULL.

An abundant migrant, passing in large numbers from the middle of April to the end of May, and again in October. May be found in the state during the entire summer, but not known to breed.

60. *Larus philadelphia* (Ord)—BONAPARTE GULL.

An uncommon migrant, breeding north of the United States. The only records for this gull are from Salt lake, west of Lincoln, where it has been taken a number of times—on Oct. 28, 1895; Nov. 3, 1896; May 6, 1899; Sept. 29, 1900.

62. *Xema sabinii* (Sabine)—SABINE GULL.

Rare winter visitant. An immature specimen of this northern gull was captured from a flock circling about an electric light at Beatrice, Sept. 2, 1899, by Swenk, and a little later, on the 30th of the same month, another specimen, also immature, was shot at Salt lake, near Lincoln, by M. A. Carriker, Jr. The latter specimen is now in the University collection. This gull has generally been considered quite rare, but it has been taken a number of times in Colorado and once in Kansas, and may prove commoner than is generally believed.

64. *Sterna caspia* Pallas—CASPIAN TERN.

Our only record is of a specimen shot at Salt lake, near Lincoln, May 5, 1893, by F. L. Riser, and now in the Wesleyan University collection. Though its breeding range would include our state, it is probably only a migrant here. The Royal Tern, 65. *Sterna maxima* Boddaert, though a southern breeder, wanders in summer up the Mississippi valley even to the Great Lakes, so is likely to occur in our state as a straggler.

69. \**Sterna forsteri* Nuttall—FORSTER TERN.

A very common migrant over the state, and breeds abundantly throughout the lake region of Cherry county, but not recorded breeding elsewhere in Nebraska. Arrives about the middle of April and departs early in October.

70. *Sterna hirundo* Linnaeus—COMMON TERN.

A rare migrant. Has been taken at Omaha, West Point, and Lincoln, at the latter locality several times. It has been taken in Kansas and Wyoming also. Aughey does not record this species, but he does the Arctic Tern, 71. *Sterna paradisæa* Brueppnich, of which he states that a few were seen in Dixon county in May, 1866. But as the specimens are not stated to have been shot and as *paradisæa* is so similar to *hirundo*, which he does not mention, the chances for a misidentification are too great to warrant the continued inclusion of *paradisæa*

in our list. It has, however, been taken in Colorado twice, and it is very likely to eventually be taken here also.

74. \**Sterna antillarum* (Lesson)—LEAST TERN.

A common migrant, and not a rare breeder, especially in northeastern Nebraska. Aughey found young birds along the Missouri in Dixon county in July, 1866, and also records it from Cedar county in August and from Lancaster and Sarpy counties in June. L. Skow found it breeding at Cut-off lake near Omaha, in the summer of 1893. Wilson Tout found five nests on a basin near York during the summers of 1896 and 1897, and Swenk found it common and breeding in July, 1903 on the sandbars of the Niobrara from Badger to its mouth. Numerous migration records from West Point, Omaha, Peru, and Lincoln.

77. \**Hydrochelidon nigra surinamensis* (Gmelin)—BLACK TERN.

An abundant migrant and rather common breeder in suitable localities over the state; in the lakes of Cherry county it breeds in great numbers. Arrives late in April and departs by the middle of October.

EXTRALIMITAL: Three species of gulls included in the above key, viz.: 40. *Rissa tridactyla* (Linnaeus)—Kittiwake, 42. *Larus glaucus* Brunnich—Glaucous Gull, and 43. *Larus leucopterus* Faber—Iceland Gull; are northern species which are not known from Nebraska, but which winter regularly south to the Great Lakes and even farther, so may straggle to our state; especially is this true of the Kittiwake which has straggled even to Wyoming and Colorado. The California Gull, 53. *Larus californicus* Lawrence, has never been taken in Nebraska so far as known, but has been taken a few times in Colorado and once even in western Kansas, so may be reasonably expected as a straggler here also.

### ORDER III. STEGANOPODES—TOTIPALMATE SWIMMERS

- A. Upper mandible not hooked at tip; neck very long; plumage dark. .... Anhingidæ.
- A. Upper mandible hooked at tip. .... (B)
  - B. Tail 14 to 20 inches long, forked for half its length; lores feathered. .... Fregatidæ.
  - B. Tail 5 to 10 inches long, not forked; lores bare. .... (C)
- C. Bill under 4 inches in length, its pouch moderate; plumage in adult mostly black. .... Phalacrocoracidæ.
- C. Bill 8 to 15 inches long, its pouch enormous; plumage in adult mostly white. .... Pelicanidæ.

### FAMILY ANHINGIDÆ—ANHINGAS

[The first two families included above are represented each by a single species in North America. To the first belongs 118. *Anhinga anhinga* (Linnaeus), the Anhinga or Snake Bird of the southern swamps, which occurs up the Mississippi valley to Kansas and southern Illinois, and which was included in Bruner's list as a Nebraska bird on the authority of a speci-

men shot supposedly near Omaha, and mounted by F. J. Brezee at that place. It has since developed, however, that the bird may have been secured either in Iowa or Missouri, and unless it can be definitely determined where the specimen came from this species must be excluded from our list.]

#### FAMILY FREGATIDÆ—FRIGATE BIRDS

[The second family is represented by 128. *Fregata aquila* (Linnaeus), the Frigate Bird or Man-o'-War Bird, a species of tropical and subtropical oceans which because of its extraordinary powers of flight occasionally strays inland into temperate regions, and has been recorded from Texas, Kansas, Ohio, and Wisconsin. In the spring of 1884 Bruner saw a bird near West Point which he took to be this species, and a later oceanic acquaintance with it has convinced him of the correctness of the identification. But in view of the unusual nature of the record and the lack of a specimen it is not given full standing in the list.]

#### FAMILY PHALACROCORACIDÆ—CORMORANTS

1. Pouch orange, white at base; wing under 11 inches; young with belly black. . . . . **Mexican Cormorant.**
1. Pouch wholly orange; wing over 11 inches; young with belly brown. (2)
  2. Wing 12 to 13 inches long, tail  $6\frac{1}{2}$ , bill  $2\frac{1}{4}$ ; color browner . . . . . **Double-crested Cormorant.**
  2. Wing  $11\frac{1}{4}$  to  $12\frac{1}{2}$  inches long, tail  $5\frac{1}{2}$ , bill  $2\frac{1}{10}$ ; color blacker . . . . . **Florida Cormorant.**
120. *Phalacrocorax dilophus* (Swainson and Richardson)—**DOUBLE-CRESTED CORMORANT.**

A not common migrant. West Point, Omaha, Lincoln, Nebraska City, York, Beatrice, Neligh, Cherry county, etc. April, and October and November. Breeds from northern states northward.

[The Florida Cormorant, 120a. *P. d. floridanus* (Audubon) has been reported several times from Nebraska, but all the specimens at present available are referable to *dilophus*. However birds occur which are decidedly smaller than average *dilophus*, and since *floridanus* has been found north to southern Illinois as a breeder, it is thought best to leave its status an open question for the present. The Mexican Cormorant, 121. *Phalacrocorax mexicanus* (Brandt), reported by Bruner, was not seen by him personally, but included in his list on the statement of a friend, who probably had seen a specimen of the common species. It has, however, been found north to southern Illinois and Kansas, and may straggle to Nebraska.]

#### FAMILY PELICANIDÆ—PELICANS

1. Plumage white, primaries black; crown brownish in young; tarsus over  $3\frac{1}{2}$  inches. . . . . **White Pelican.**
1. Plumage gray above, brownish below, head white, in summer hind neck brown; young brownish, white below; tarsus under  $3\frac{1}{2}$  inches. . . . . **Brown Pelican.**

125. *Pelecanus erythrorhynchos* Gmelin—WHITE PELICAN.

A common migrant throughout the state, breeding from northern states northward. Seen from late in March or early in April to early in May and from late in September to the end of October. Three were seen by Wolcott on Dewey lake, Cherry county, daily during a visit there from May 28 to June 8, 1903.

126. *Pelecanus occidentalis* (Linnaeus)—BROWN PELICAN.

Rare; a subtropical species which has strayed north to Illinois and Wyoming as well as to Nebraska. One definite record, a male taken at St. Paul, Howard county, Oct. 10, 1885, and reported by D. H. Talbot. L. Skow reports having seen "fragments of six specimens in a hog-pen where they had been thrown by the man who shot them" at Honey Creek lake near Omaha, in spring, but there is considerable chance for error in this record.

#### ORDER IV. ANSERES

##### FAMILY ANATIDÆ—DUCKS, GEESE, AND SWANS

1. Neck as long as body; tarsus 4 inches or more; wing 20 inches or more long; adult entirely white; the young dirty grayish white. . . (2)
1. Neck shorter than the body; tarsus under 4 inches long. . . (3)
  2. Bare skin in front of eye marked with yellowish; back end of nostril much nearer tip of bill than to eye . . . . . Whistling Swan.
  2. Bare skin in front of eye without yellow; back end of nostril about midway from eye to tip of bill. . . . . Trumpeter Swan.
3. Tarsus, 2 to 4 inches long and longer than middle toe without claw; front of tarsus with rounded scales instead of square scutellæ. . . . . (4)
3. Tarsus not over 2 inches long and shorter than the middle toe without claw; front of tarsus with distinct scutellæ. . . . . (11)
  4. Serrations on the cutting edge of the upper mandible visible from the side for more than half length of bill; bill and feet pale . . . (5)
  4. Serrations scarcely visible from the side at all; if visible then only at the base; bill, feet, and portions of the head black. . . . . (8)
5. Depth of bill at base about  $\frac{1}{2}$  the length of culmen; forehead white in mature bird. . . . . White-fronted Goose.
5. Depth of bill at base much greater than  $\frac{1}{2}$  the length of culmen. . . (6)
  6. General plumage gray, grayish brown, or brown without conspicuous white margins to wing-coverts. . . . . Blue Goose.
  6. General plumage of adult white; young grayish brown with the wing-coverts widely margined with white. . . . . (7)
7. Length 23 to 28 inches, middle toe 2 to  $2\frac{1}{2}$  inches. . . Lesser Snow Goose.
7. Length 30 to 38 inches; middle toe  $2\frac{3}{4}$  to  $2\frac{1}{2}$  inches Greater Snow Goose.
  8. Head black; neck at sides and in front white streaked; belly white. . . . . Brant.
  8. Head partly white. . . . . (9)
9. Lower parts deep grayish brown; white cheek patches generally sepa-

- rated by black throat stripe or mottling. . . . . **Cackling Goose.**
9. Lower parts light brownish gray, fading gradually into white on anal region; white cheek patches usually confluent on throat. . . . . (10)
10. Larger, 35 to 43 inches long. . . . . **Canada Goose.**
10. Smaller, 25 to 34 inches long. . . . . **Hutchins Goose.**
11. Bill nearly cylindrical, about as wide as high throughout; head always more or less crested. . . . . (12)
11. Bill always wider than high near the tip; head rarely crested. . . . (14)
12. Smaller; wing 7 to  $8\frac{1}{2}$  inches long; crest high and flattened sidewise. . . . . **Hooded Merganser.**
12. Larger;  $8\frac{1}{2}$  to  $11\frac{1}{2}$  inches long; crest inconspicuous. . . . . (13)
13. Wing about  $10\frac{1}{2}$  inches long; frontal feathers extending beyond those on side of bill. . . . . **American Merganser.**
13. Wing about 9 inches long; frontal feathers not extending beyond those on side of bill. . . . . **Red-breasted Merganser.**
14. Hind toe with a rounded membranous lobe. . . . . (15)
14. Hind toe without a lobe-like border. . . . . (27)
15. Wing 7 inches or less in length. . . . . (16)
15. Wing over 7 inches long. . . . . (17)
16. Upper tail-coverts very short; bill broad; tail flat. **Ruddy Duck.**
16. Upper tail-coverts about half as long as tail; head fluffy. . . . . **Buffle-head.**
17. Bill appendaged with a lobe at base formed of skin of cheeks; culmen about one inch long. . . . . **Harlequin Duck.**
17. Bill bulging at base; nail large and so united with the bill as to give the nail a very indistinct outline . . . . . (18)
17. Bill of the usual duck form. . . . . (20)
18. Wing  $10\frac{1}{2}$  inches long or more; a white wing patch in both sexes. . . . . **White-winged Scoter.**
18. Wing less than  $10\frac{1}{2}$  inches long. . . . . (19)
19. Feathers on the culmen reaching forward as far as those on sides of upper mandible. . . . . **American Scoter.**
19. Feathers on the culmen reaching about an inch farther forward than those on side of upper mandible. . . . . **Surf Scoter.**
20. Tail pointed (over 6 inches long, male; about 3 inches long, female;) bill black and orange, nostril within less than  $\frac{1}{4}$  inch of frontal feathers. . . . . **Old-squaw Duck.**
20. Tail not pointed; nostril about  $\frac{1}{2}$  inch from frontal feathers. . (21)
21. Bill high at base (over half as high as long); under tail-coverts white (22)
21. Bill lower at base; under tail-coverts dark. . . . . (23)
22. Male with the gloss of the dark head and throat green; head of female brown. . . . . **Golden-eye.**
22. Male with the gloss of the dark head and throat purple; head of female brown . . . . . **Barrow Golden-eye.**
23. Bill decidedly wider near tip than at base. . . . . (24)
23. Bill but little if any wider at tip than at base. . . . . (26)

24. Male with an orange ring around neck; speculum brownish gray; female chiefly brown. . . . . **Ring-necked Duck.**
24. Male with white speculum; female with white face. . . . . (25)
25. Length 18 to 20 inches; wing over  $8\frac{1}{4}$  inches long. . . . . **Scaup Duck.**
25. Length 15 to  $16\frac{1}{2}$  inches wing under  $8\frac{1}{4}$  inches long. . . . . **Lesser Scaup Duck.**
26. Bill about half as wide as the length of the culmen . . . . . **Red-head.**
26. Bill about half as wide as long. . . . . **Canvas-back.**
27. Bill decidedly broadened toward tip, being nearly twice as wide here as at base. . . . . **Shoveller.**
27. Bill but little if any widened toward tip. . . . . (28)
28. Head conspicuously crested; crown green with purple reflections; throat white. . . . . **Wood Duck.**
28. Head not crested. . . . . (29)
29. Central tail feathers over 7 inches long (male) or broad and sharp-pointed (female); neck unusually long. . . . . **Pintail.**
29. Tail and neck not especially lengthened. . . . . (30)
30. Bill decidedly shorter than the head; belly white. . . . . (31)
30. Bill about as long as head, or longer. . . . . (32)
31. Head and throat mainly buffy, finely barred with black. . . . . **Baldpate.**
31. Head and throat with much brown or reddish brown **European Widgeon.**
32. Wing less than  $8\frac{1}{2}$  inches long . . . . . (33)
32. Wing over  $9\frac{1}{2}$  inches long. . . . . (35)
33. Wing-coverts leaden gray without blue. . . . . **Green-winged Teal.**
33. Wing-coverts sky blue. . . . . (34)
34. Culmen usually more than  $1\frac{3}{8}$  inches; head, neck and lower parts uniform rich cinnamon brown (male); female slightly ruddier than same sex of Blue-winged. . . . . **Cinnamon Teal.**
34. Culmen generally less than  $1\frac{3}{8}$  inches; head and neck dull plumbeous, with a large crescent-shaped white patch in front of eye; lower part pale chestnut, spotted with black (male); head and neck streaked with dusky. . . . . **Blue-winged Teal.**
35. Speculum white or grayish white. . . . . **Gadwall.**
35. Speculum a rich purple with a black border. . . . . (36)
36. Speculum bordered at both ends with narrow black and white bands. . . . . **Mallard.**
36. Speculum with only a black border, seldom with any white. . . . . (37)
37. Crown without paler margins; throat usually without markings; legs olivaceous brown; bill greenish black, dusky olive, or olive-green. . . . . **Black Duck.**
37. Crown edged with buff or gray; throat spotted; legs red; bill yellow . . . . . **Red-legged Black Duck.**
37. Similar to the last but lighter colored and with small black spot at lower edge of upper mandible at base. . . . . **Mottled Duck.**
129. **Merganser americanus** (Cassin)—**AMERICAN MERGANSER.**  
A regular, and in some localities, common, migrant; early in spring and late in fall. Breeds from Minnesota northward.

130. *Merganser serrator* (Linnaeus)—RED-BREASTED MERGANSER.

A rare migrant, but reported by one or more observers nearly every season. Also seen early in spring and late in fall, breeding northward. Bruner reports it as seen on the Platte river in mid-winter.

131. \**Lophodytes cucullatus* (Linnaeus)—HOODED MERGANSER.

A common migrant, breeding sparingly along the wooded streams in the eastern part of the state and also reported to have bred at least formerly in the timbered canyons of northern Nebraska. A young one was taken by Swenk from a brood of six or seven following the mother on the Blue river at Beatrice in July, 1900, and Bruner also found young on a pond at West Point years ago. A brood of half-grown young were seen at Lincoln Aug. 2, 1900, by J. S. Hunter. Migrates in April and October.

132. \**Anas boschas* Linnaeus—MALLARD.

An abundant migrant; coming very early in spring, usually before the first of March, lingering late in fall, and staying all winter where there is open water. Breeds all over the state, more commonly than elsewhere in the sand-hill region. In the collection of August Eiche is a specimen undoubtedly a cross between this and the Black Duck, and another of very large size apparently a cross between the Mallard and some tame duck.

133. *Anas obscura* Gmelin—BLACK DUCK.

An uncommon migrant, not known to breed in the state. It is an abundant duck in eastern United States and Nebraska lies at the westward limit of its range. Reported from Omaha, Lincoln, and Cherry county. Migrates about the same time as the Mallard. All specimens accessible are referable to this form and not to the next, which has only recently been recognized, but it is possible that some of the records refer to the latter.

[133a. *Anas obscura rubripes* Brewster—RED-LEGGED BLACK DUCK.

There is no definite record of this duck for the state, but Bruner is inclined to believe, from notes made at the time, that the single observation by himself of the Black Duck at West Point, a number of years ago, should refer to this subspecies.]

135. \**Chaulelasmus streperus* (Linnaeus)—GADWALL.

A common migrant, seen from the middle of March to the middle of April, and from the middle of October to the middle of November. Also a frequent breeder about the lakes of the sand-hill region, nests and young having been taken by Bruner in Holt county and by Wolcott in Cherry county.

136. *Mareca penelope* (Linnaeus)—EUROPEAN WIDGEON.

Of this European bird, of which stragglers have been taken from time to time in various parts of this country, there is one valid record for Nebraska, a single specimen having been taken by Bruner at West Point years ago.

137. *Mareca americana* (Gmelin)—AMERICAN WIDGEON; BALDPATE.

A common migrant, found from about March 10 to the end of April and from the middle of September to the middle of November. It is seen, though in limited numbers, during the whole summer about the lakes of the sand-hill region and probably breeds there.

139. *\*Nettion carolinensis* (Gmelin)—GREEN-WINGED TEAL.

An abundant migrant, coming early in spring, about the first of March, remaining till the end of April, and here again in fall from early in September to the end of November. It is occasionally seen in summer and it has been noted by observers in all parts of the state as wintering regularly wherever there is open water. It breeds chiefly north of the United States, and must be looked upon as only an accidental breeder in Nebraska. But in the latter part of June, 1902, Wolcott observed, at Dewey lake, Cherry county, a pair which was undoubtedly breeding; they were observed on several occasions at a locality exactly suited to their nesting, and the actions of the birds showed unmistakable evidences of the presence of a nest, but the character of the cover was such that although a careful search was made, it could not be found.

140. *\*Querquedula discors* (Linnaeus)—BLUE-WINGED TEAL.

An abundant migrant and common summer resident. Arrives usually in the latter part of March and departs by the first of November. It breeds sparingly in southeastern Nebraska, more commonly about ponds and marshes farther west and north, clear to the western boundary, and is an abundant breeder in the sand-hill region, every pond or marsh, no matter how small, having one or more pairs located in its vicinity.

141. *Querquedula cyanoptera* (Vieillot)—CINNAMON TEAL.

An occasional migrant only, its normal range being from the Rocky mountains westward. Reported from Omaha, West Point, Niobrara, Lincoln, Grand Island, and Cherry county; dates—Omaha, April 10, 1896, and April 12, 1897, and Lincoln, April 11, 1896.

142. *\*Spatula clypeata* (Linnaeus)—SHOVELLER.

A very common migrant and common summer resident. Arrives early in March and stays till the middle of November. Breeds commonly in the sand-hill region and sparingly in various other parts of the state.

143. *\*Dafila acuta* (Linnaeus)—PINTAIL.

An abundant migrant, the first duck to appear in the spring and one of the last to pass in the fall. Does not linger, the advance guard appearing with the first warm days in February, and nearly all having gone on by the first of April to their breeding grounds in the states to the northward. A few breed in Cherry county, where a brood of half-grown young was seen by Wolcott on Hay lake, June 17, 1902.



144. *\*Aix sponsa* (Linnaeus)—WOOD DUCK.

Largely confined to the eastern half of the state; formerly common, now somewhat rare. Breeds in suitable localities throughout eastern Nebraska. Arrives in spring early in April and last seen about the middle of October.

146. *Aythya americana* (Eyton)—RED-HEAD.

An abundant migrant, arriving early in March, remaining till the first of May, and here again throughout October and November. Although Nebraska is at the southern limit of its breeding range, a considerable number stay regularly in the sand-hill region and doubtless breed.

147. *\*Aythya vallisneria* (Wilson)—CANVAS-BACK.

Rather an irregular migrant, some years abundant, others less common. Found in spring from late in February to the middle of April, and in the fall during October and November. Breeds chiefly from North Dakota northward, but a few are seen in summer about the lakes of Cherry county, where they are known to breed. A nest with eggs advanced in incubation was found near Cody, in northern Cherry county, by I. S. Trostler in the latter part of June, 1895, and J. M. Bates reports the Canvas-back as breeding at Irwin in 1896 and 1897, and at Hackberry lake in 1897.

148. *Aythya marila* (Linnaeus)—SCAUP DUCK; BLUE-BILL.

A rare migrant, though formerly more common, and most frequent along the Missouri river. Omaha, Lincoln, Peru, West Point, Neligh, Cherry county. Breeds to the northward.

149. *Aythya affinis* (Eyton)—LESSER SCAUP; LITTLE BLUE-BILL.

An abundant migrant, seen from the middle of March even to the latter part of May and from early in October to the end of November. Breeds from North Dakota northward, but a few remain about the lakes of Cherry county all summer and it may breed there.

150. *Aythya collaris* (Donovan)—RING-NECKED DUCK.

A common migrant, being found at the same time as the preceding. It is present in Cherry county throughout the summer and may breed.

151. *Clangula clangula americana* (Bonaparte)—GOLDEN-EYE.

A resident from the northern boundary of the United States northward, only coming down to us during the winter, when it is not uncommon, especially on the Platte and Missouri rivers. Seen from the middle of November to the end of March, sometimes lingering to the end of April.

152. *Clangula islandica* (Gmelin)—ROCKY MOUNTAIN OR BARROW GOLDEN-EYE.

A rare winter visitant in eastern Nebraska, more numerous west-

ward. Reported from Omaha, South Bend, Long Pine, and Grand Island.

153. *Charitonetta albeola* (Linnaeus)—BUFFLE-HEAD.

A common migrant, present from about the middle of March to the middle of April and during October and November. Breeds to the northward.

154. *Harelda hyemalis* (Linnaeus)—OLD-SQUAW DUCK.

A regular, but not common winter visitor, specimens being taken every season on the Missouri river in the vicinity of Omaha. Merritt Cary records the taking of a female near Neligh in October, 1898. Breeds far north, chiefly beyond the limit of trees.

155. *Histrionicus histrionicus* (Linnaeus)—HARLEQUIN DUCK.

Of this northern duck, there are two definite records for Nebraska, I. S. Trostler recording the taking of two specimens on the Missouri river at Omaha, Sept. 16, 1893, and of another on Florence lake near Omaha, Sept. 19, 1895. Bruner also notes the securing of a specimen in the Omaha market several years ago from among birds said to have been shot in Burt county.

163. *Oidemia americana* Swainson—AMERICAN SCOTER.

The first record for the state was based on a female specimen taken on Salt lake, near Lincoln, Sept. 28, 1895, by August Eiche and now in his collection. Specimens have since been taken at Omaha and it can apparently be considered an irregular winter visitant, to be looked for in flocks on the Platte and Missouri rivers.

165. *Oidemia deglandi* Bonaparte—WHITE-WINGED SCOTER.

This duck is also a winter visitant to the larger rivers and lakes in the state; being the most common of the scoters. Bruner in his Notes on Nebraska Birds refers to an indefinite record from Tekamah or some point in the vicinity. The first definite record is by August Eiche, based on a specimen secured Oct. 14, 1899, on Salt lake near Lincoln; he also reported a flock Nov. 13 of the same year. J. E. Wallace records the taking of a specimen at Cut-off lake, near Omaha, Dec. 8, 1900, and the species has been seen there several times since. It must be considered a regular and not very rare winter visitor.

166. *Oidemia perspicillata* (Linnaeus)—SURF SCOTER.

Also a winter visitant to the larger bodies of water in the state, but apparently not so common as the last. Bruner refers to three birds probably of this species, shot on Salt lake, near Lincoln, in Nov., 1895, by university students, which were not preserved; but here again August Eiche has the honor of the first definite record for the state, having a male in his collection taken at the same place, Oct. 7, 1896. It has since been taken at Omaha and is probably a regular winter visitor.

167. *\*Erismatura jamaicensis* (Gmelin)—RUDDY DUCK.

A very common migrant and a common breeder on the lakes of the sand-hill region. Arrives about the middle of March and lingers in the southeastern part of the state till the end of May; in the fall migrates during October and November.

169. *Chen hyperborea* (Pallas)—LESSER SNOW GOOSE.

A very common migrant, breeding far north. Migration dates from about March 1 to the first of May, and from the latter part of September to the middle of November. Usually called "Brant" in this state.

169a. *Chen hyperborea nivalis* (Forster)—GREATER SNOW GOOSE.

A rather rare migrant, occurring at about the same time as the last. Recorded from Omaha, West Point, South Bend, Lincoln, and Waco.

169.1. *Chen caerulescens* (Linnaeus)—BLUE GOOSE.

Formerly seen alone, according to Bruner, in small flocks, though never common; now rather rare and only seen flying with the snow geese. Breeds about Hudson's bay.

171a. *Anser albifrons gambeli* (Hartlaub)—WHITE-FRONTED GOOSE.

A not uncommon migrant, seen from early in March to the middle of April and from the end of September to the middle of November. Breeds in the far north.

172. *\*Branta canadensis* (Linnaeus)—CANADA GOOSE.

An abundant migrant; from as early in February as the ice breaks up even to the middle of May, and from the middle of October to late in the fall. Also found on the Platte and Missouri rivers during all ordinary winters. Formerly bred about the lakes in the sand-hill region and on the islands of the Platte and Missouri rivers, and a few are found breeding there still.

172a. *Branta canadensis hutchinsli* (Richardson)—HUTCHINS GOOSE.

A common migrant, at the same time as the preceding but appearing a little later in the spring. Breeds in Alaska.

173. *Branta bernicla glaucogastra* (Brehm)—BRANT.

The only definite record of this goose for the state is reported by I. S. Trostler who saw three that were killed on the Missouri river at Omaha, Nov. 9, 1895. L. Skow says there is, or was, a specimen in an Omaha gun store, said to have been shot on the Platte river. Breeds within the Arctic circle and seen chiefly along the Atlantic coast.

180. *Olor columbianus* (Ord)—WHISTLING SWAN.

A rare migrant now, formerly more common, and more numerous than the next. Seen from the middle of March to the middle of April and late in September and in October. Breeds far north.

181. \**Olor buccinator* (Richardson)—TRUMPETER SWAN.

Now rare and apparently never known to be common. Recorded from localities along the Platte river, Omaha, North Platte, and Grant and Cherry counties. J. M. Bates reports this species as having formerly bred on Watt's lake, Cherry county, and it probably was once a breeder about many of the lakes of the sand-hill region.

EXTRALIMITAL: 134a. *Anas fulvigula maculosa* (Sennett), the Mottled Duck, breeds from Texas to middle Kansas and may reach southern Nebraska. 172c. *Branta canadensis minima* Ridgway, the Cackling Goose of the northwest coast, has been taken in the interior as far east as Wisconsin and may reach Nebraska during migrations.

ORDER V. HERODIONES—HERONS, STORKS, IBISES, ETC.

- A. Sides of upper mandible with a deep narrow groove. Bill slender, nearly round, not widened at end, and decurved throughout. . . . . *Ibidae*.
- A. Sides of upper mandible without a groove. . . . . (B)
- B. Middle toe not pectinate, hind toe elevated above others. . . . . *Ciconiidae*.
- B. Middle toe pectinate, hind toe on same level with others. *Ardeidae*.

FAMILY IBIDÆ—IBISES

- 1. General color white in adult, grayish brown above and white below in young. . . . . *White Ibis*.
- 1. Chestnut with purplish and greenish reflections in adult; dark brown with greenish reflections on the back in young. . . . . (2)
- 2. Lores greenish in life; feathers around bill same color as back. . . . . *Glossy Ibis*.
- 2. Lores red; feathers around bill white. . . . . *White-faced Glossy Ibis*.

186. *Plegadis autumnalis* (Hasselquist)—GLOSSY IBIS.

A specimen taken near Omaha, Bruner thinks at Cut-off lake, is now in the University museum, and there are two specimens in the collection of L. Sessions, of Norfolk, taken at that place. Straggler in summer from the southeast.

187. *Plegadis guarauna* (Linnaeus)—WHITE-FACED GLOSSY IBIS.

A straggler from the south. Two specimens are recorded from Omaha, by I. S. Trostler and L. Skow, one killed near Florence lake, Aug. 19, 1893, and a second near Cut-off lake, Apr. 6, 1897. A specimen was secured years ago, according to Bruner, by Frank Parmalee of Omaha, at Clarks.

EXTRALIMITAL: 184. *Guara alba* (Linnaeus)—The White Ibis is stated to occur casually north to South Dakota and may be looked upon as a probable addition to our fauna sooner or later.

FAMILY CICONIIDÆ—STORKS AND WOOD IBISES

A large white bird, 35 to 45 inches long, with greenish black tail and wing

quills; head and neck mostly naked; bill stout, tapering, the end curved downward. . . . . **Wood Ibis.**

[188. *Tantalus loculator* Linnaeus—WOOD IBIS.

While no records are at hand which would warrant us retaining this bird in our Nebraska lists, it has been definitely recorded from states as far north as Wisconsin and as far west as Colorado. Unconfirmed observations by sportsmen of single birds of the above description would point to its having been seen here as well.]

**FAMILY ARDEIDÆ—HERONS, BITTERNS, ETC.**

1. Outer toe shorter than the inner one; nail on hind toe fully half as long as the toe. . . . . (2)
1. Outer toe as long or longer than the inner one; nail on hind toe less than half as long as its toe. . . . . (3)
  2. Size large, length 24 to 34 inches. . . . . **Bittern.**
  2. Size small, length 13 inches. . . . . **Least Bittern.**
3. Bill slender, fully four times as long as it is high at its base. . . . . (4)
3. Bill rather stout, only about three times as long as it is high at base. . . (9)
  4. General color white during breeding season with "aigrette" plumes on back. . . . . (5)
  4. General color, at least above, blue or brownish slate, the "aigrette" plumes short and gray, or with elongate narrow feathers instead. . . . . (7)
5. Larger; length 40 inches; bill yellow; feet and legs black; back plumes straight. . . . . **American Egret.**
5. Smaller; length 22 to 24 inches. . . . . (6)
  6. Bill, legs, and feet black; plumes recurved. . . . . **Snowy Heron.**
  6. Bill black, legs and feet greenish yellow; tips of primaries bluish. . . . . **Little Blue Heron, young.**
7. Very large, length 45 inches; center of crown white; the occiput provided with elongate plumes; legs blackish (adult); crown black, head not crested (young). . . . . **Great Blue Heron.**
7. Smaller, length from 17 to 26 inches; head feathers forming more or less of a crest. . . . . (8)
  8. Length 17 inches; neck and sides of head purplish chestnut; back and wings greenish washed with bluish gray. . . . . **Green Heron.**
  8. Length 22 to 26 inches; head and neck maroon, rest of plumage slaty blue (adult). . . . . **Little Blue Heron.**
9. Bill less than one-half an inch shorter than tarsus; its top and bottom but slightly convex; crown and back greenish black (adult). Grayish brown streaked with white above; primaries with pale rufous (young). . . . . **Black-crowned Night Heron.**
9. Bill over one-half an inch shorter than tarsus; its top and bottom decidedly convex; blue-gray, crown and ear-coverts whitish (adult). Crown black, streaked with white; primaries bluish slate (young). . . . . **Yellow-crowned Night Heron.**

190. *\*Botaurus lentiginosus* (Montague)—BITTERN.

A common migrant throughout the state, breeding everywhere in suitable localities but much more commonly in the sand-hill region than elsewhere. Migrating during April and late in September and in October, lingering sometimes into December.

191. *\*Ardetta exilis* (Gmelin)—LEAST BITTERN.

A common summer resident in the eastern portion of the state in suitable localities, rare in the sand-hill region, and not so far recorded from the western part of the state. Arrives in the latter part of April or early in May and departs during the latter part of September and in October.

194. *\*Ardea herodias* Linnaeus—GREAT BLUE HERON.

Found along rivers and streams throughout the state, and breeds here and there in appropriate places; more common eastward and especially along the Missouri river, where it nests in colonies in the largest trees of the river bottom.

196. *Herodias egretta* Gmelin—AMERICAN EGRET.

Of this heron there are four records for the state. Aughey states that he saw a single specimen on the Nemaha in Richardson county in May, 1873. A specimen was killed near Omaha, July 12, 1894, and reported by I. S. Trostler. L. Skow reports it from Nebraska City, and Swenk records seeing one on Cedar creek, near Beatrice, July 12, 1900. A straggler from the south, occurring in southern and eastern Nebraska in summer.

197. *\*Egretta candidissima* Gmelin—SNOWY HERON.

An occasional straggler from the south in summer, and a rare, perhaps accidental, breeder. We have several records of its occurrence: Aughey records it from Otoe and Richardson counties; I. S. Trostler from near Fremont, Sept. 4, 1893; Swenk from Fairbury; and one was shot in the Hat creek valley in extreme northwestern Nebraska and the specimen mounted. August Eiche has recorded a nest of this bird at Lincoln, in June, 1895, the female which was shot on the nest being now in his collection (See Proc. N. O. U., II, 96).

200. *Florida caerulea* Linnaeus—LITTLE BLUE HERON.

A straggler from the south in summer, to the southern part of the state. Reported from Butler county, on the Platte river, by a Dr. Peebles, according to Bruner; also observed by Trostler near Omaha June 15, 1897 and Aug. 15, 1903; and a specimen is in the collection of Rees Heaton of Curtis, killed on an artificial lake at that place. Bruner also records a specimen from near Omaha years ago brought to F. J. Brezee to be mounted, but whether killed in Iowa or Nebraska is not known. It has been reported as breeding north of Omaha, on the Iowa side of the Missouri river, but this is probably an error. Possibly some of the records of the preceding species may have referred to the young of this, since at that age it is white.

201. *\*Butorides virescens* Linnaeus—GREEN HERON.

A very common summer resident in eastern Nebraska, but not reported west of the eastern one-third of the state. Omaha, Peru, West Point, Oakdale, Neligh, Lincoln, Gresham, Beatrice—breeding at all localities. Merritt Cary reports it as an abundant summer resident and breeder at Neligh. Arrives in April, departs late in September or early in October.

202. *\*Nycticorax nycticorax naevius* (Boddaert)—BLACK-CROWNED NIGHT HERON.

A common migrant over the greater part of the state, becoming rare in the extreme western portion, and a common breeder here and there in the northern portion of the state and in the sand-hill region. In the latter locality it nests in the rushes about the lakes. Not known to breed south of about the middle portion of the state. Arrives in April, departs late in September and early in October.

203. *Nyctanassa violacea* (Linnaeus)—YELLOW-CROWNED NIGHT HERON.

A rare straggler from the south in summer. Recorded from Valley by Bruner years ago and an immature male shot on the Blue river near Beatrice by Swenk, July 19, 1901. One was killed at Omaha, on the Iowa side of the Missouri river, May 1, 1892, and recorded by I. S. Trostler who also reports one near Florence lake, Aug. 23, 1903.

## ORDER VI. PALUDICOLÆ—CRANES, RAILS, ETC.

- A. Wing over 15 inches long; hind toe much elevated.....*Gruidæ*.  
A. Wing under 10 inches long; hind toe very slightly elevated....*Rallidæ*.

## FAMILY GRUIDÆ—CRANES

1. General plumage of adult white; of young more rusty tinged; tarsus 10½ to 13 inches long.....*Whooping Crane*.
1. General plumage of adult slaty to brownish gray.....(2)
  2. Smaller, length 35 inches; tarsus 7½ inches. . .*Little Brown Crane*.
  2. Larger, length 44 inches; tarsus 10 inches. . . . .*Sandhill Crane*.

204. *Grus americana* (Linnaeus)—WHOOING CRANE.

Formerly a fairly common migrant in the state, now rare, although as late as 1899 reported by Cary as a rather common migrant at Neligh. Occurs from late in March, through April and again in October. May have once bred in the sand-hill region.

205. *Grus canadensis* (Linnaeus)—LITTLE BROWN CRANE.

Very rare migrant, breeding far north. Bruner has recorded specimens from West Point and Scribner and L. Skow has reported it from Omaha. Cary reports one killed at Neligh in May, 1895.

206. *\*Grus mexicana* (Mueller)—SANDHILL CRANE.

Formerly a very abundant migrant and a common breeder in the marshes of the state, still frequently seen in migration and breeding

sparingly in the sand-hill region. Arrives late in March and in April and departs in October.

**FAMILY RALLIDÆ—RAILS, GALLINULES, AND COOTS**

1. Forehead provided with a shield-like, horny extension of the bill; under tail-coverts white. . . . . (2)
1. Forehead without the shield-like, horny extension of bill. . . . . (4)
  2. Toes with broad, membranous lobes; slate-colored, with white-tipped secondary quills. . . . . Coot.
  2. Toes without lobes. . . . . (3)
3. Most of the head and all under parts purplish blue (in the young mottled with white); back olive-green (washed with brownish in the young). . . . . Purple Gallinule.
3. Generally slate-colored above, with conspicuous white streaks on the flanks. . . . . Florida Gallinule.
  4. Bill slender, decurved, 2 or more inches long; upper parts rich olive-brown, streaked with black; 16 to 19 inches long. . . . . King Rail.
  4. Bill slender, decurved,  $1\frac{1}{2}$  to  $1\frac{3}{4}$  inches long; upper parts black and grayish brown; 8 to  $10\frac{1}{2}$  inches long. . . . . Virginia Rail.
  4. Bill stout, not decurved, 1 inch or less in length. . . . . (5)
5. Feathers of the back black with broad, buffy borders. . . . . Yellow Rail.
5. Back blackish with round, white spots. . . . . Black Rail.
5. Olive-brown, streaked with white on back and wings. . . . . Sora.

**208. \*Rallus elegans Audubon—KING RAIL.**

A summer resident in the eastern third of the state, but not common, arriving early in May and breeding in June. West Point, Elkhorn, Omaha, and Sarpy, Lancaster, and Harlan counties—breeding at Omaha. In the Proc. N. O. U., II, p. 84, J. S. Hunter reports the King Rail from Cherry county but later experience seems to throw doubt on this identification, although since in the Proceedings, I, p. 16, J. M. Bates says this species was reported to him as on Ballard's lake, in the same locality, in September, 1898, its occurrence in the sand-hill region may later be verified.

**212. \*Rallus virginianus Linnaeus—VIRGINIA RAIL.**

A common migrant, at times even abundant, and also a common breeder in the northern part of the state and in the sand-hill region, but a rather rare breeder in the southeastern portion of Nebraska. Arrives early in May, leaves about the end of September. Omaha, West Point, Plattsmouth, Lincoln, Gresham, Neligh, and Cherry county—found once breeding at Lincoln, and a common breeder at Neligh and in Cherry county.

**214. \*Porzana carolina (Linnaeus)—CAROLINA RAIL; SORA.**

An abundant migrant, and rather common breeder in the eastern part of the state, a rare breeder in the sand-hill region. Same dates as the preceding. West Point, Oakland, Peru, Richardson county,



Lincoln, Gresham, Beatrice, Ponca, Ewing, O'Neill, North Platte, Cherry county; breeding at Omaha, at Neligh, and in Holt county.

215. *Porzana noveboracensis* (Gmelin)—YELLOW RAIL.

Very rare. Bruner reports it once from Bellevue, and has seen it once, years ago, in the Omaha market. There is a specimen, taken at Norfolk, in the collection of L. Sessions of that place.

216. *Porzana jamaicensis* (Gmelin)—BLACK RAIL.

Rare. Aughey records two, taken in Richardson county, in September, 1873, and Bruner reports it from West Point, and in the Omaha market. It may breed.

218. *Ionornis martinica* (Linnaeus)—PURPLE GALLINULE.

Only recorded once from Nebraska, a specimen being seen by Bruner, at West Point, in June or July of 1884 or 1885. It was during high water; and the bird, seen about a rush-grown, cut-off lake, was approached to within twenty yards or less.

219. *\*Gallinula galatea* (Lichtenstein)—FLORIDA GALLINULE.

Quite a common but locally distributed summer resident in southeastern Nebraska, rare in sand-hill region. Omaha, Dunbar, Beatrice, North Platte, Cherry county. Reported as a common breeder at Omaha, as breeding at North Platte, and breeding on the one occasion on which it was noted from Cherry county, by Wolcott.

221. *\*Fulica americana* Gmelin—COOT.

An abundant migrant, and in the lakes of the sand-hill region an abundant resident; also common as a resident everywhere in the state where reedy sloughs and ponds are found. Arrives during the first half of April and departs in October.

## ORDER VII. LIMICOLÆ—SHORE BIRDS

- A. Toes with lobed webs on the sides; tarsus much compressed. . . . . *Phalaropodidæ*.
- A. Toes not lobed on the sides; tarsus not especially compressed. . . . . (B)
  - B. Tarsus more than twice as long as middle toe and claw. . . . . *Recurvirostridæ*.
  - B. Tarsus less than twice as long as middle toe and claw. . . . . (C)
- C. Front of tarsus covered with a continuous row of transverse four-sided scales. . . . . (E)
- C. Front of tarsus covered with small six-sided irregular scales. . . . . (D)
  - D. Bill shorter than tarsus. . . . . *Charadriidæ*.
  - D. Bill longer than tarsus. . . . . *Hematopodidæ*.
- E. Bill slender, with a bluntly rounded tip. . . . . *Scolopacidæ*.
- E. Bill stout, with a pointed wedge-shaped tip. . . . . *Aphrizzidæ*.

## FAMILY PHALAROPODIDÆ—PHALAROPES

- 1. Larger; bill over  $1\frac{1}{2}$  inches long. . . . . *Wilson Phalarope*.
- 1. Smaller; bill under 1 inch long. . . . . (2)

2. Bill stout and with a flattened tip; wing more than  $4\frac{1}{2}$  inches long. . . . . **Red Phalarope.**
  2. Bill quite slender and not flattened at tip, wing less than  $4\frac{1}{2}$  inches long. . . . . **Northern Phalarope.**
223. **Phalaropus lobatus** (Linnaeus)—**NORTHERN PHALAROPE.**  
 A rare migrant. Reported by F. W. Powell from Alda in Cooke's Bird Migration in the Mississippi Valley; by I. S. Trostler from Omaha, where a specimen was taken May 6, 1896; and several times at Lincoln, by D. A. Haggard, August Eiche, and J. S. Hunter, in May and from the end of August to the end of October. Breeds far to the north.

224. **\*Steganopus tricolor** (Vieillot)—**WILSON PHALAROPE.**  
 An abundant migrant throughout the state and a common breeder in the sand-hill region. Migrates during the latter part of April and the first half of May and during September and early in October. Omaha, Peru, West Point, Fremont, Lincoln, Fullerton, Neligh, Dakota and Dixon counties, North Platte, etc.—migrating; summer resident in Holt county, breeding in Cherry county and reported by J. A. Dickinson as probably breeding at Gresham; May 30, 1896, when two pairs were observed.

**EXTRALIMITAL:** 222. *Crymophilus fulicarius* (Linnaeus), the Red Phalarope, is a species breeding far to the north and coming south rarely in winter to the northern Mississippi valley. Has been recorded from Illinois, Minnesota, and Wyoming, and it might occur in Nebraska.

#### **FAMILY RECURVIROSTRIDÆ—AVOCETS AND STILTS**

1. Bill decidedly curved upward, over 3 inches long; the 3 front toes connected by webs. . . . . **Avocet.**
1. Bill only slightly curved upward, less than 3 inches long; the 2 outer toes only webbed. . . . . **Black-necked Stilt.**

225. **\*Recurvirostra americana** Gmelin—**AVOCET.**  
 A rather common migrant over the state and a frequent breeder in the sand-hill region. Migrates late in April and during May and again during September and October. Omaha, West Point, Richardson county, Lincoln, Wood river, Gresham, etc.; found by Wolcott breeding at Clear lake, Cherry county, in June, 1902.

226. **Himantopus mexicanus** (Mueller)—**BLACK-NECKED STILT.**  
 This bird, a southern species, but recorded from Illinois, Minnesota, and Kansas as a straggler, and as breeding in Colorado, has only been observed in Nebraska in the vicinity of Omaha, from where L. Skow and I. S. Trostler record it, the latter giving the following dates: May 10, 1893; May 6, 1894; Apr. 20, 1895; and Oct. 3 and 9, 1894. May possibly breed in southwestern Nebraska.

**FAMILY SCOLOPACIDÆ—SNIPES, SANDPIPERS, ETC.**

1. Bill long and much decurved; tarsi scaled in front only; reticulate behind. . . . . (2)
1. Bill not strongly decurved; tarsi scutellate both in front and behind. . (3)
  2. Bill over  $4\frac{1}{2}$  inches long. . . . . **Long-billed Curlew.**
  2. Bill under  $4\frac{1}{2}$  inches, but over 3 inches long. . . . . **Hudsonian Curlew.**
  2. Bill under 3 inches long. . . . . **Eskimo Curlew.**
3. Toes three, the hind toe wanting. . . . . **Sanderling.**
3. Toes four, the hind toe present. . . . . (4)
  4. Eyes back of middle of head; bill twice as long as tarsus. . . . . (5)
  4. Eyes not back of middle of head; bill not twice as long as tarsus. (6)
5. Crown banded crosswise; axillars not barred; tibiæ entirely feathered. . . . . **Woodcock.**
5. Crown striped lengthwise; axillars barred; joint of tibiæ naked. . . . . **Wilson Snipe.**
  6. Front toes with at least one distinct web . . . . . (7)
  6. Front toes not distinctly webbed. . . . . (19)
7. Bill slightly curved upward at tip. . . . . (8)
7. Bill straight throughout, or curved slightly downward. . . . . (9)
  8. Bill  $3\frac{1}{2}$  to  $5\frac{1}{2}$  inches long; rump and upper tail-coverts barred with brown. . . . . **Marbled Godwit.**
  8. Bill  $2\frac{1}{2}$  to  $3\frac{1}{2}$  inches long; rump and tail black, with white upper tail-coverts. . . . . **Hudsonian Godwit.**
9. Axillars barred with black. . . . . (10)
9. Axillars not barred. . . . . (13)
  10. Legs yellow. . . . . (11)
  10. Legs blackish. . . . . (12)
11. Wing over  $7\frac{1}{2}$  inches long. . . . . **Greater Yellow-legs.**
11. Wing under 7 inches long. . . . . **Yellow-legs.**
  12. Bill averaging under  $2\frac{1}{2}$  inches long. . . . . **Dowitcher.**
  12. Bill averaging over  $2\frac{1}{2}$  inches long. . . . . **Long-billed Dowitcher.**
13. Bill over 2 inches long. . . . . **Western Willet.**
13. Bill under 2 inches long. . . . . (14)
  14. Tail with cross-bars. . . . . (15)
  14. Tail without cross-bars. . . . . (17)
15. Wing over  $5\frac{1}{2}$  inches long. . . . . **Bartramian Sandpiper.**
15. Wing under  $5\frac{1}{2}$  inches long. . . . . (16)
  16. Upper parts brownish gray, barred with blackish; under parts spotted. . . . . **Spotted Sandpiper.**
  16. Upper parts fuscous, spotted with white. . . . . **Solitary Sandpiper.**
  16. Upper parts fuscous, spotted with buffy, inner margin of outer primary, speckled black and white. . . . . **Western Solitary Sandpiper.**
17. Bill over  $1\frac{1}{10}$  inches long. . . . . **Stilt Sandpiper.**
17. Bill under  $1\frac{1}{10}$  inches long. . . . . (18)
  18. Bill  $\frac{3}{4}$  to  $\frac{1}{2}$  of an inch long. . . . . **Semipalmated Sandpiper.**
  18. Bill  $\frac{1}{2}$  of an inch to  $1\frac{1}{2}$  inches long. . . . . **Western Sandpiper.**

19. Inner web of outer primary speckled with blackish.....  
 ..... **Buff-breasted Sandpiper.**
19. Inner web of outer primary not speckled.....(20)  
 20. Wing over 6 inches long.....**Knot.**  
 20. Wing under 6 inches long.....(21)
21. Bill curved downward.....**Red-backed Sandpiper.**
21. Bill straight.....(22)  
 22. Bill over  $1\frac{1}{4}$  inches long.....**Purple Sandpiper.**  
 22. Bill under  $1\frac{1}{4}$  inches long.....(23)
23. Wing under 4 inches long.....**Least Sandpiper.**
23. Wing over 4 inches long.....(24)  
 24. Upper tail-coverts white.....**White-rumped Sandpiper.**  
 24. Upper tail-coverts black.....**Pectoral Sandpiper.**  
 24. Upper tail-coverts fuscous.....**Baird Sandpiper.**

228. **\*Philohela minor** (Gmelin)—WOODCOCK.

A rare migrant in the extreme eastern part of the state, breeding occasionally along the bottomlands of the Missouri river and other wooded streams flowing into it. Omaha, West Point, and Sarpy and Otoe counties; stragglers reported from Beatrice and Lincoln, and even as far as Neligh. Arrives late in March and leaves in October. May winter in mild seasons.

230. **Gallinago delicata** (Ord)—WILSON SNIPE.

A very common migrant throughout the state and found in winter about springs in Holt, Cherry, Dawes, and Sioux counties, and along the Missouri river. It may possibly breed in northern Nebraska, as is claimed by some ranchmen, since it is reported staying all summer at North Platte by M. K. Barnum, was seen in Cherry county by Trostler late in June, 1895, and in the same region in June, 1900, by J. S. Hunter. Migrates during the latter part of April and in May, and again from the end of September to the middle of November.

231. **Macrorhamphus griseus** (Gmelin)—DOWITCHER.

Specimens which were referred to this species have been reported from West Point, Lincoln, and Omaha, by Bruner; from Omaha by Skow and Trostler; April 30, 1893 and Sept. 15, 1894; from Neligh by Cary, May 16, 1899; from Cherry county by Bates; and from Lincoln by August Eiche, in whose collection is a specimen with a bill only 2.25 inches long. Aughey's records of this species probably refer to the next. It is claimed by many authorities that the Dowitcher is only found in the eastern states and that all western specimens represent simply variations of the Long-billed Dowitcher. So long as the authorities are not unanimous these records are allowed to stand for what they are worth. The two species differ in color in the breeding plumage but in the winter plumage are indistinguishable.

232. *Macrorhamphus scolopaceus* (Say)—LONG-BILLED DOWITCHER.

An irregular migrant, sometimes common. Aughey reported it years ago under the name *griseus* as abundant. Found from the middle of April to the middle of May and throughout September and October and even into November. Dixon, Wayne, Nemaha, and Sarpy counties, Omaha, West Point, Lincoln, Cherry county, North Platte. Breeds in British America.

233. *Micropalama himantopus* (Bonaparte)—STILT SANDPIPER.

Usually considered a rare migrant, but has been seen at Lincoln at times in large numbers, in May and again in September and October. Omaha, West Point, Lincoln, Neligh, Holt county, Long Pine, Cherry county. Breeds far north.

234. *Tringa canutus* Linnaeus—KNOT.

Rare. Aughey records a specimen from Brownville, Oct., 1874; Trostler one from Omaha, Sept. 30, 1893; J. S. Hunter one from Lincoln, May 16, 1896; and August Eiche has a specimen in his collection taken at Lincoln, Aug. 27, 1896. Breeds in Arctic regions.

239. *Actodromas maculata* (Vieillot)—PECTORAL SANDPIPER.

A common migrant, seen late in April and in May and in September and October. Frequents fields and pastures and often called "Grass Snipe." West Point, Lincoln, Peru, Omaha, Gresham, North Platte, Cherry county. Breeds far north.

240. *Actodromas fuscicollis* (Vieillot)—WHITE-RUMPED SANDPIPER.

A rather common migrant, though not so numerous as the preceding, and not so frequently reported. Seen at about the same time though more inclined to linger even to June. Omaha, Peru, Lincoln, Fairbury, Cherry county. Also a breeder only to the north.

241. *Actodromas bairdii* Coues—BAIRD SANDPIPER.

An abundant migrant, frequently lingering all summer, but only breeding far to the north. The earliest sandpiper to appear in the spring, sometimes as early as the middle of March, always by the first of April, remaining in large flocks till the end of May, and here again in fall migration from the middle of August till the end of October. Throughout the state.

242. *Actodromas minutilla* (Vieillot)—LEAST SANDPIPER.

An abundant migrant, also lingering, especially in northern Nebraska, throughout the summer. In June and early in July 1902, Swenk found representatives of several species of shore birds along the Niobrara river; examination of sexual organs showed no evidence of development except in this species, of which two pairs were seen about a small pond acting as if breeding, and the ovaries of which showed a marked development. Its usual breeding grounds are in British America; Hatch claims that it also breeds in Minnesota. Migrating from the end of March or first of April to the end of May, and from early in August to November. Throughout the state.

243a. *Pelidna alpina pacifica* (Coues)—RED-BACKED SANDPIPER.

Rare. Recorded only from Omaha, where L. Skow took a specimen May 12, 1895, and from Lincoln, where specimens have been taken by D. A. Haggard; by J. S. Hunter, May 16, May 30, and Nov. 7, 1896; and by August Eiche, May 22, 1899. Breeds far north.

246. *Ereunetes pusillus* (Linnaeus)—SEMIPALMATED SANDPIPER.

A common migrant, usually in company with the Least Sandpiper, and breeding in high latitudes. Reported from localities throughout the state. Specimens in the collection of F. L. Riser, taken at Lincoln are dated June 8 and July 8, 1897.

[247. *Ereunetes occidentalis* Lawrence—WESTERN SANDPIPER.

Reported once from Omaha by L. Skow. Though Nebraska comes within the accepted range of the species, the identification does not seem to be entirely beyond question.]

248. *Calidris arenaria* (Linnaeus)—SANDERLING.

An irregular migrant, sometimes numerous. Reported from West Point and Lincoln by Bruner, from Omaha by Trostler and Skow, and from North Loup by D. H. Talbot; A. R. Graves took a specimen at Alliance, April 6, 1892, and specimens from Lincoln are in the collection of August Eiche, dated May 21, 1895, Aug. 22, 1896, and Oct. 4, 1898. Chiefly maritime.

249. *Limosa fedoa* (Linnaeus)—MARBLED GODWIT.

A common migrant, found from the middle of April to the middle of May, and from the end of August to early in October. West Point, Omaha, Lincoln, Ashland, Gresham, and Cherry and Holt counties. Aughey also reports it from Cedar and Wayne counties, and says it breeds in Nebraska, though so far as we know no nest was ever found within our limits. His statement is probably the basis for the inclusion of this state in the breeding range as given by various authorities, but since the bird is known to have bred in Iowa, Minnesota, and the Dakotas, and has been frequently seen here in summer, it almost certainly breeds in Nebraska also.

251. *Limosa hæmastica* (Linnaeus)—HUDSONIAN GODWIT.

A rare migrant, and reported by but a few observers. Recorded from West Point, Oakland, Lincoln, and Holt county, by Bruner; J. S. Hunter and August Eiche have collected specimens nearly every year in May at the lake near Lincoln. Breeds far north.

254. *Totanus melanoleucus* (Gmelin)—GREATER YELLOW-LEGS.

A common migrant, from early in April to the middle of May and from the end of August to November. Recorded from various localities west to Cherry county and North Platte. Reported in Bruner's Notes on Nebraska Birds as breeding at Peru and in Holt county. The former was probably an error, but Bruner has seen this species in pairs in Holt county in summer, and since it has been

known to breed in northern Illinois and in Minnesota, it is not unlikely that it breeds occasionally in Nebraska.

255. *Totanus flavipes* (Gmelin)—YELLOW-LEGS.

An abundant migrant; seen also all summer, but there is no evidence that it breeds. Seen at the same time as the last species.

256. *\*Helodromas solitarius* (Wilson)—SOLITARY SANDPIPER.

A common migrant; here in May and in September, and to be met with chiefly along creeks and small streams. Recorded from all parts of the state. Reported from Cherry county by J. M. Bates, and from Neligh by Merritt Cary as frequently and regularly seen in summer though no nest has been taken by either; Aughey, however, records seeing the young in Dakota county in August, so it probably is a regular though not common breeder in the northern portion of the state. It is known to breed from northern Illinois northward.

258a. *\*Symphemia semipalmata inornata* Brewster—WESTERN WILLET.

A rather common migrant, passing through from the middle of April to the middle of May and again in September. Recorded from various localities west to Cherry county. It is frequently seen in summer, especially about the lakes of the sand-hill region, and J. M. Bates reports having seen young at Kennedy.

261. *\*Bartramia longicauda* (Bechstein)—BARTRAMIAN SANDPIPER.

An abundant migrant throughout the state, breeding commonly in the southern and eastern portion and abundantly in the sand-hill region and on the high plains of the north and west. Arrives about the middle of April and departs about the middle of September.

262. *Tryngites subruficollis* (Vieillot)—BUFF-BREASTED SANDPIPER.

A rare and irregular migrant, apparently not so common as in former times. Aughey recorded one specimen from Nebraska City, in September, 1874; Bruner reports it as formerly fairly common at West Point, and the same report comes from L. Sessions at Norfolk; it is also reported from Omaha, Lincoln, Beatrice, DeWitt, and Neligh. Has been taken late in July and in August at Lincoln, but breeds far north.

263. *\*Actitis macularia* (Linnaeus)—SPOTTED SANDPIPER.

A common migrant; also a frequent breeder in northern Nebraska, and an occasional breeder in the southern part of the state. Arrives about the first of May, last seen about the middle of October. Reported from numerous localities west to Cherry county, and once by Cary from Andrews, Sioux county, late in May, 1901.

264. *\*Numenius longirostris* Wilson—LONG-BILLED CURLEW.

Formerly an abundant migrant throughout the state, now very irregular in the eastern portion, though common westward. In former times an abundant breeder also to the eastern edge of the sand-hill region, still a common breeder locally from Cherry county west-

ward, nesting in dry valleys. Arrives by the middle of April, departs by the first of September.

265. *Numenius hudsonicus* Latham—HUDSONIAN CURLEW.

Now a rare and irregular migrant, formerly more numerous. Recorded once or twice from West Point, and once from Holt county, by Bruner; from Lincoln by August Eiche and by Wolcott, Oct. 8, 1898. Breeds far north.

266. *Numenius borealis* (Forster)—ESKIMO CURLEW.

Formerly very abundant in flocks of thousands, and killed by wagon-loads for food in the early days of the state, now very seldom seen in eastern portion, but still said by sportsmen to be fairly common in the western. Migrating in April and October, and breeding in the Arctic regions.

EXTRALIMITAL: 235. *Arquatella maritima* Bruennich, the Purple Sandpiper, is said to migrate in winter southward to the Great Lakes and the shores of the larger streams in the upper Mississippi valley, though chiefly maritime. It may be looked for on the Missouri river. The Western Solitary Sandpiper, 256a. *H. s. cinnamomeus* Brewster, is a western form said to range eastward to the plains, and may be expected to occur in western Nebraska.

FAMILY CHARADRIIDÆ—PLOVERS

1. Toes four, the hind toe present but very small; above mottled brownish gray and white, below white in fall, black in spring.....
1. Toes three, the hind toe wanting.....(2)
2. Back decidedly and brightly dotted with golden and whitish spots on a dark ground; below grayish in fall, varied with more or less black in spring..... Golden Plover.
2. Back uniform plain brown or gray, without decided spots.....(3)
3. Rump bright orange-brown in conspicuous contrast to the brownish back; white lower parts crossed by a neck-ring and breast-band of black..... Killdeer.
3. Rump dull colored, never bright, rust red; not more than one black band on lower parts.....(4)
4. No black patches on sides of breast or black band across it; but an indistinct band of buffy; adults with a crown-stripe and lore-stripe of black; above grayish brown varied with reddish..... Mountain Plover.
4. Breast either crossed by a continuous black band or with conspicuous black patches on the sides.....(5)
5. Space between eye and bill dark brown or black; a heavy black breast-ring, and in spring sides of head and fore crown black; toes webbed at base; back brownish..... Semipalmated Plover.
5. Space between eye and bill white; toes not distinctly webbed at base... (6)
6. Bill entirely black and a black spot on the sides of the head; also



- a black line above the forehead and the sides of the breast with large black patches not connected; above pale grayish, below pure white. . . . . **Snowy Plover.**
6. Bill yellow at base and black at tip, and sides of head not black; sides of breast with black patches, which are connected by a narrow breast-line; a black crown-line; back pale grayish. . . . . **Belted Piping Plover.**
270. *Squatarola squatarola* (Linnaeus)—**BLACK-BELLIED PLOVER.**  
A regular migrant, but not usually common. However, F. W. Powell records an instance in which he saw thousands on the Platte river, May 21, 1883 (See Cooke's Bird Migr. in Miss. Val., p. 98). Migrating late in April and early in May and in September and October. Sarpy county, Lincoln, Omaha, Alliance, Atkinson, Neligh, Alda, North Platte. Breeds in Arctic regions.
272. *Charadrius dominicus* Mueller—**GOLDEN PLOVER.**  
Formerly abundant, in flocks of hundreds, still rather common; not recorded west of Holt county. Found from the middle of April to the middle of May and in September and October. Also breeds in Arctic regions.
273. *\*Oxyechus vociferus* (Linnaeus)—**KILLDEER.**  
An abundant migrant, and also abundant summer resident in the sand-hill region, a common breeder over the rest of the state, especially northward. Arrives early in March and remains till November.
274. *Aegialitis semipalmata* Bonaparte—**SEMIPALMATED PLOVER.**  
A common migrant. Seen during May and September and the first half of October. Breeds in British America. Not reported west of Neligh.
- 277a. *\*Aegialitis meloda circumcincta* Ridgway—**BELTED PIPING PLOVER.**  
A fairly common migrant; breeds about the lakes in the sand-hill region, along the Niobrara river, in northern Nebraska, on the Loup at Dannebrog, along the Platte, and perhaps on any of the rivers of the state where are the sand-bars on which it nests. Aughey recorded it breeding in Dakota county in July, 1866, where he found two nests. Arrives in May and departs during the latter part of September.
278. *Aegialitis niyosa* Cassin—**SNOWY PLOVER.**  
This species was included in Bruner's Notes on Nebraska Birds based on the seeing of a flock of what was supposed to be this plover in Holt county in the spring of 1885. But the first definite record, and so far the only one, was established by the taking of two specimens at the lake near Lincoln, May 17, 1903, by Swenk. It must be looked upon as a rare straggler from the west.
281. *Podasocys montanus* (Townsend)—**MOUNTAIN PLOVER.**  
Not uncommon in extreme western Nebraska, where Bruner has

observed it at Sidney, Marsland, and Harrison. It was seen in summer and probably breeds. It is a common breeder in Wyoming.

FAMILY **APHRIZIDÆ**—SURF BIRDS AND TURNSTONES

A medium sized, stout billed, brightly marked bird; above mottled bright **rufous**, black and white, the rufous replaced by gray in winter  
..... Ruddy Turnstone.

283.1. **Arenaria morinella** (Linnaeus)—**RUDDY TURNSTONE**.

A regular but not common migrant. So far all specimens seen have been in May. Omaha, Lincoln, Norfolk, Long Pine. Breeds far north; more frequent along sea-coasts.

- [286. **Haematopus palliatus** Temminck, the American Oyster-catcher, belonging to the family Haematopodidae, should be omitted from our list. The evidence on which it was included in Bruner's Notes on Nebraska Birds is not sufficient to warrant the retention of this bird, which is entirely maritime, and has never been recorded inland.]

ORDER VIII. **GALLINÆ**—GALLINACEOUS BIRDS

- A. Tarsi without spurs. .... **Tetraonidæ**.  
A. Tarsi with spurs. .... **Phasianidæ**.

FAMILY **TETRAONIDÆ**—GROUSE, PARTRIDGES, ETC.

1. Wing, 10 inches or more long; tail feathers stiff and pointed; tail about as long as the wing. .... **Sage Grouse**.
1. Wing under 10 inches; the tail feathers not especially stiff. .... (2)
  2. Wing 8 to 10 inches long. .... (3)
  2. Wing 8 inches or less. .... (7)
3. Tail about 2 inches shorter than wing, square, black with a distinct terminal gray band. .... **Dusky Grouse**.
3. Tail  $3\frac{1}{2}$  to 5 inches shorter than wing. .... (4)
  4. Tail pointed, wedge shaped; tarsus fully feathered. .... (5)
  4. Tail rounded. .... (6)
5. Ground-color, above buffy or pale grayish clay-color, with little or no rusty tinge. .... **Columbian Sharp-tailed Grouse**.
5. Ground-color, above more rusty or ochraceous. **Prairie Sharp-tailed Grouse**.
  6. Tarsus fully feathered, no bare strip behind. .... **Prairie Hen**.
  6. Tarsus scantily feathered, exposing a bare strip behind. .... **Lesser Prairie Hen**.
7. Larger,  $15\frac{1}{2}$  to 19 inches long, with a ruff of black feathers on each side of neck, and broad, fan-shaped tail. .... **Ruffed Grouse**.
7. Smaller, 10 inches long; brownish-mottled, white throated, bare legged  
..... **Bob-white**.

289. **\*Colinus virginianus** (Linnaeus)—**BOB-WHITE**.

Formerly confined to the eastern portion of Nebraska; now practically over the entire state, especially along river and creek valleys

and about farms where natural shelter occurs. It is exceptionally abundant on the upper Elkhorn and the streams emptying into the Missouri river west of Yankton, South Dakota. During recent years showing a tendency towards domestication.

[297. *Dendragapus obscurus* (Say)—DUSKY GROUSE.

The range of the Dusky Grouse points to its probable occurrence among the pines of Sioux and Dawes counties. While spending a short time in that region a number of years ago Bruner was informed by some ranchmen of the presence of the "Fool Hen" on Indian creek only a mile or two west of the state line.]

300. \**Bonasa umbellus* (Linnaeus)—RUFFED GROUSE.

This Grouse is confined to the wooded portions of the eastern one-fifth of the state where it is rare. Rockport, South Omaha—breeding (L. Skow); Weeping Water, Waverly, Richardson county.

305. \**Tympanuchus americanus* (Reichenbach)—PRAIRIE HEN.

Entire state. Formerly abundant in the eastern portion, where it is still common; now plentiful in central portions, especially northward; becoming rarer towards the western end; partially migratory, moving southeastward in fall and northwestward in spring.

307. *Tympanuchus pallidicinctus* Ridgway—LESSER PRAIRIE HEN.

The Lesser Prairie Hen formerly occurred in Cuming and Washington counties where a number were shot in the early seventies by Omaha and local sportsmen. Some of these specimens were mounted and are supposed to be still in existence. Bruner saw a living bird at West Point during the winter of 1871-72 which was approached to within a few yards, but was not taken. It has also been reported from Clay county, South Dakota, by Dr. Agersborg. To our knowledge it has not been seen nor taken within the state since the above dates.

308b. \**Pedicecetes phasianellus campestris* Ridgway—PRAIRIE SHARP-TAILED GROUSE.

A common bird in the sand-hill region of the middle and western portions of the state where it breeds; formerly spreading to the eastward in winter to Cuming and Dodge counties.

309. \**Centrocercus urophasianus* (Bonaparte)—SAGE GROUSE.

Not common and confined to the extreme northwestern portions of the state in regions where sage-brush (*Artemisia tridentata*) abounds; along Hat, Antelope, and Indian creeks in Sioux county, where it has several times been reported to breed and where Carriker and Cary found old birds with half-grown young in the summer of 1901 (Proc. N. O. U., III, p. 77).

EXTRALIMITAL: The Columbian Sharp-tailed Grouse, 308a. *P. p. columbianus* (Ord), referred to in Bruner's Notes on Nebraska Birds was an error and based on rather light-colored specimens of *P. p. campestris* taken in the northwestern part of the state along the Pine ridge.

FAMILY PHASIANIDÆ—PHEASANTS, TURKEYS, ETC.

1. Very large, 40 to 50 inches long; tail broad; plumage lustrous; head and upper neck without feathers; breast with tuft of hair-like feathers ..... **Wild Turkey.**
1. Medium sized, 20 to 30 inches long; tail lengthened and graduated, the feathers tapering to a point; adult male with white neck-ring, the neck and head feathered, breast rich coppery chestnut, with metallic purple and coppery reflections; female brownish, more or less spotted and mottled with darker. .... **Ring-necked Pheasant.**

310. *Meleagris gallopavo silvestris* (Vieillot)—WILD TURKEY.

This magnificent bird was formerly abundant throughout the wooded portions of the state and even on the adjoining prairies as far west along the Platte and Republican rivers as McCook and North Platte. Now, if present at all, very rare; confined to the heavier bodies of timber between the mouth of the Niobrara and Sioux City in the vicinity of Rockport north of Omaha, and between Brownville and Rulo. In territorial days it was common along the Elkhorn, the Big and Little Blue rivers, and on the Niobrara to Long Pine, as well as along the wooded borders of others of our streams.

000. *Phasianus torquatus* Gmelin—RING-NECKED PHEASANT.

This introduced Asiatic pheasant seems to have gained a precarious foothold in portions of southeastern Nebraska where individual birds are occasionally to be met with. A few of them are shot each year although there is a statute making their killing a misdemeanor punishable by a fine of fifty dollars for each bird so destroyed. Table Rock, Pawnee, and Barnston.

ORDER IX. COLUMBÆ—DOVES AND PIGEONS

FAMILY COLUMBIDÆ—DOVES

1. Larger, 15 to 17 inches long; tail  $8\frac{1}{4}$  inches, pointed; back slate-blue; below chestnut near chin to whitish toward tail . . . **Passenger Pigeon.**
1. Smaller, 11 to 13 inches long; tail  $5\frac{1}{4}$  inches, less pointed; back brownish; under parts brownish to yellow or buff. .... **Mourning Dove.**

315. *Ectopistes migratorius* (Linnaeus)—PASSENGER PIGEON.

Formerly rather common along the Missouri river. Now very rare, and probably entirely absent from the state. The last records of its presence as a Nebraska bird are from West Point, Norfolk, Florence, Papillion, and Omaha.

316. *\*Zenaidura macroura* (Linnaeus)—MOURNING DOVE.

An exceedingly common bird over the entire state; chiefly a summer resident, arriving in April and departing during November. Some individuals remain throughout winter in sheltered localities southward. It nests both in trees and on the ground, and rears from two to three broods of young during the summer months.

## ORDER X. RAPTORES—BIRDS OF PREY.

- A. Head entirely without feathers, nostrils longitudinal. . . . . **Cathartidæ.**
- A. Head fully feathered, nostrils vertical or roundish. . . . . (B)
  - B. Eyes lateral, not surrounded by discs of radiating feathers. . . . . **Falconidæ.**
  - B. Eyes set in front, surrounded by discs of radiating feathers. . . (C)
- C. Middle claw pectinate. . . . . **Strigidæ.**
- C. Middle claw not pectinate . . . . . **Bubonidæ.**

### FAMILY CATHARTIDÆ—AMERICAN VULTURES

- 1. A very large bird, 26 to 32 inches long, dull black, naked headed, hook billed; tail rounded, nostrils large and broad; skin of neck and head red. . . . . **Turkey Vulture.**
- 1. Somewhat smaller, 22 to 27 inches long; blacker; tail square; nostrils small and narrow; skin of head and neck black. . . . . **Black Vulture.**

#### 325. *\*Cathartes aura* (Linnaeus)—TURKEY VULTURE; TURKEY BUZZARD.

A moderately common bird during spring, summer and fall; rare in winter. It has been reported as nesting in Sioux, Cherry, Frontier, Custer, Douglas, Lancaster, and Richardson counties—practically throughout the state in suitable localities.

#### 326. *Catharista urubu* (Vieillot)—BLACK VULTURE; CARRION CROW.

The Black Vulture, which is confined chiefly to the warmer portions of the United States and tropical America, is known to wander northward casually to Maine, Ohio, Illinois, and South Dakota. We have a single authentic record by D. H. Talbot, who took it on Wolf creek. Other, but unconfirmed, reports would point to its occasionally visiting our southern borders.

### FAMILY FALCONIDÆ—FALCONS, HAWKS, EAGLES, ETC.

- 1. Talons or claws all of the same length, narrowed and rounded on lower side; wing 17 to 22 inches long; scales of the tarsus small, rounded . . . . . **Osprey.**
- 1. Talons of graduated length, the hind one longest, the outer shortest. . . (2)
  - 2. Tarsus densely feathered all around and to the toes; wing 22 to 28 inches long. . . . . **Golden Eagle.**
  - 2. Tarsus bare for at least one-third of its length, or if feathered to the toes, having a bare strip behind. . . . . (3)
- 3. Tarsus bare behind, feathered to the toes in front; length of wing, 15 to 20 inches. . . . . (4)
- 3. Tarsus not feathered to the toes even in front; size quite variable. . . . (5)
  - 4. Feathers of legs more or less buffy; bill small and weak. . . . . **American Rough-legged Hawk.**
  - 4. Feathers of legs bright brownish red with black bars; bill much longer and stronger. . . . . **Ferruginous Rough-leg.**
- 5. Wing over 19 inches long; adult with white head, neck, and tail. **Bald Eagle.**
- 5. Wing under 18 inches. . . . . (6)

6. Tail deeply forked; above glossy bluish black, the head, rump, and under parts white. . . . . **Swallow-tailed Kite.**
6. Tail but slightly if at all forked. . . . . (7)
7. Wing 7 or more times as long as tarsus; bill with no sharp teeth or notches; nostrils elongated and without inner bony tubercle. . . . . (8)
7. Wing 7 times as long as the tarsus; bill with a sharp notch and tooth back of tip; nostril circular and with an inner bony tubercle. . . . . (9)
7. Wing 6 or less times as long as tarsus. . . . . (10)
  8. Tail white without bars and square tipped. . **White-tailed Kite.**
  8. Slaty blue above, gray below; tail black, unbarred. . . . . **Mississippi Kite.**
9. Tarsus hardly at all feathered above; sides of head black. . . **Duck Hawk.**
9. Tarsus feathered less than half way down in front. . . . **Prairie Falcon.**
9. Tarsus feathered over half way down in front and on sides. . . . . **Gray Gyr Falcon.**
10. Upper tail-coverts white; tail gray (male), ferruginous (female); barred with blackish. . . . . **Marsh Hawk.**
10. With neither the general plumage black nor the upper tail-coverts white. . . . . (11)
11. Nostril circular and with a conspicuous central bony tubercle; upper mandible with a strong tooth and notch back of hooked tip. . . . (12)
11. Nostril oval and the upper mandible without more than one lobe or tooth, and that weak. . . . . (16)
12. Wing 11 to 17 inches long; only one primary notched on inner web. . . . . **Duck Hawk, Prairie Falcon, Gray Gyr Falcon.**
12. Wing 5 to 9½ inches long; two primaries notched. . . . . (13)
13. Back bluish slate-color, or blackish and without bright rufous. . . . (14)
13. Back or belly with more or less of bright brownish red. . . . . (15)
  14. Above slaty blue; middle tail feather with not more than four black bands. . . . . **Pigeon Hawk.**
  14. Similar to preceding, but paler; middle tail feather crossed by six light bars, counting the terminal one. . . . **Richardson Merlin.**
15. Tail with one black bar; male spotted below; whole back barred; female tail with numerous black bars; below streaked. **Sparrow Hawk.**
15. Similar to preceding, but slightly larger and appreciably paler, black bars and streaks narrower. . . . . **Desert Sparrow Hawk.**
16. Tail about  $\frac{3}{4}$  as long as wing. . . . . (17)
16. Tail not over  $\frac{3}{4}$  as long as wing. . . . . (19)
17. Wing under 9 inches long; the tail square. . . . . **Sharp-shinned Hawk.**
17. Wing 9 to 11 inches long; the tail rounded. . . . . **Cooper Hawk.**
17. Wing 11½ to 14½ inches long. . . . . (18)
  18. Above bluish slate-color, crown darker, a whitish line over eye to the nape; below finely marked with gray and white. . . . **American Goshawk.**
  18. Above dark plumbeous, markings on lower parts heavier and darker. . . . . **Western Goshawk.**
19. Outer web of primaries with white buffy or reddish spots; four outer

- primaries notched on the inner web. . . . . **Red-shouldered Hawk.**
19. Outer web of primaries not as above. . . . . (20)
20. Four outer primaries notched on the inner web. . . . . (21)
20. Three outer primaries notched. . . . . (22)
21. Tail rusty brown, with a black band, sometimes broken near its tip; below buffy white, a band of spots across the belly; legs usually without bars. . . . . **Red-tailed Hawk.**
21. Similar to preceding, but nearly or wholly white below; adults usually without black tail-band. . . . . **Krider Hawk.**
21. Varying from sooty brown above and below with more or less rusty to a light phase resembling *borealis*, but tail averages paler and sometimes has more than one bar; under parts deeper and legs usually barred with rusty. . . . . **Western Red-tail.**
21. Above sooty brown; tail closely mottled with blackish, rusty, and whitish; below varying from white, more or less spotted on belly, to sooty brown. . . . . **Harlan Hawk.**
22. Wing 14 to 18 inches long; breast patch rusty brown (male) or grayish brown (female). . . . . **Swainson Hawk.**
22. Wing  $9\frac{1}{2}$  to 12 inches long; tail with two whitish bands and a brownish tip; below barred with rusty brown. . . . .
- . . . . . **Broad-winged Hawk.**
327. \**Elanoides forficatus* (Linnaeus)—**SWALLOW-TAILED KITE.**
- A regular visitor in eastern third of the state; not common. Omaha, West Point, Tekamah, Fullerton, Beatrice, Falls City; breeding at Greenwood, Rockport, and Calhoun.
- [328. *Elanus leucurus* (Vieillot)—**WHITE-TAILED KITE.**
- The record given in Bruner's Notes on Nebraska Birds of the occurrence of this species is an error. But its range is such as to make it possible that it may be taken in the state.]
- [329. *Ictinia mississippiensis* (Wilson)—**MISSISSIPPI KITE.**
- While the known range of this kite would bring it within our borders, the record by R. E. Dinges as given in Bruner's Notes on Nebraska Birds is very likely an error.]
331. \**Circus hudsonius* (Linnaeus)—**MARSH HAWK.**
- Found over the entire state, common. In part resident—a few remaining throughout winter. Breeds on low ground, more commonly in the sand-hills and northwestward.
332. \**Accipiter velox* (Wilson)—**SHARP-SHINNED HAWK.**
- A common migrant over the entire state in spring and fall, and an occasional winter resident. Breeds regularly in Sioux county. Reported by all observers.
333. \**Accipiter cooperi* (Bonaparte)—**COOPER HAWK.**
- Like the preceding, this hawk is found over the entire state in spring, summer, and fall; abundantly in the southeastern portion, common

elsewhere. Frequently seen in winter. An earlier and more general breeder than the Sharp-shinned.

334. *Accipiter atricapillus* (Wilson)—AMERICAN GOSHAWK.

A regular, but not common, winter visitant. Observed at Omaha, Lincoln, Rockport, Norfolk, and in Sioux county.

[334a. *Accipiter atricapillus striatulus* Ridgway—WESTERN GOSHAWK.

This western variety of the preceding species has been reported once from Florence, in 1896, by L. Skow, and again from Kennedy, Oct. 1896, by J. M. Bates. Very dark colored goshawks are occasionally to be met with in the state, especially westward, which may be the western variety.]

337. *\*Buteo borealis* (Gmelin)—RED-TAILED HAWK.

The typical Red-tailed Hawk is confined to the eastern half of the state where it is found in the timber belts along all the larger water-courses. It is partially migratory, but some remain throughout winter. Breeds over entire range and feeds chiefly on rabbits, ground squirrels, etc.

337a. *\*Buteo borealis kriderii* Hoopes—KRIDER HAWK.

Found chiefly westward but spreading to eastern part of state during migrations; breeds in Sioux and Dawes counties—sometimes, at least, on ledges of the canyon walls.

337b. *Buteo borealis calurus* (Cassin)—WESTERN RED-TAIL.

During migrations straggling over the entire state. Breeds commonly in both Colorado and Wyoming, and may breed also in western Nebraska. West Point, Omaha, and Lincoln.

337d. *Buteo borealis harlani* (Audubon)—HARLAN HAWK.

Casualty over eastern third of the state, but not known to breed. West Point, Omaha, Lincoln. There is a specimen in the collection of August Eiche taken at the latter locality.

339. *\*Buteo lineatus* (Gmelin)—RED-SHOULDERED HAWK.

A not uncommon hawk in the eastern part of the state, where it breeds most abundant along the Missouri river bluffs. Omaha, Bellevue, Nebraska City, Rulo, Lincoln, Neligh.

342. *\*Buteo swainsoni* Bonaparte—SWAINSON HAWK.

A very common hawk over the entire state; in fall sometimes gathering in large flocks during migrations; nesting throughout the Nebraska range eastward in trees, westward frequently on the ground. Occurring in several color variations.

343. *\*Buteo platypterus* (Vieillot)—BROAD-WINGED HAWK.

A regular and rather common summer visitant and breeder along the Missouri river and its tributaries in the eastern part of the state; rare in the interior, and a straggler in western Nebraska. Observed once at Harrison, Sioux county, by Bruner; at Long Pine by Bates, and at Neligh by Cary—numerous records farther east.



347a. *Archibuteo lagopus sancti-johannis* (Gmelin)—AMERICAN ROUGH-LEGGED HAWK.

A rather rare winter visitant in middle and southern Nebraska, but more common in the northern part of state. Breeds chiefly north of the United States. West Point, Omaha, Lincoln, Neligh, Cherry county.

348. *\*Archibuteo ferrugineus* (Lichtenstein)—FERRUGINOUS ROUGH-LEG.

This is the common rough-legged hawk in the state and occurs throughout. It is less common in the eastern portion, but becomes more plentiful as we approach the middle and western sections of the state. It nests in moderate numbers in the sand-hills, and commonly along Pine ridge and about the buttes of western and north-western Nebraska. It is a ground bird to a great extent, and frequents the vicinity of prairie dog towns, upon the inhabitants of which it preys.

349. *\*Aquila chrysaetos* (Linnaeus)—GOLDEN EAGLE.

This magnificent bird is found in moderate numbers throughout the state in winter, but is more common westward. Owing to its large size, fearless nature, and carrion-eating habits, we have numerous records of its occurrence each year, and a few still breed annually in Scott's Bluff, Sioux, and Dawes counties. It bred quite generally over the state years ago.

352. *Haliaetus leucocephalus* (Linnaeus)—BALD EAGLE.

Much less common than the preceding, and seems to be confined chiefly to our larger water-courses even during its migrations. It probably formerly bred in the more heavily wooded portions of northeastern Nebraska, and it is likely that a few still do so, but there are no definite breeding records. It likes to nest near where the Osprey makes its summer home so as to have an opportunity to rob the latter of its catch and save the work for itself. Many records.

[354. *Falco rusticolus* Linnaeus—GRAY GYRFALCON.

This northern falcon has been taken at Vermillion, S. Dak., and is known to wander casually south to Kansas. It is included here on the strength of a record of a single specimen seen by Bruner at West Point, but not positively identified; another, probably the same species, was reported to him as seen at Norfolk.]

355. *\*Falco mexicanus* Schlegel—PRAIRIE FALCON.

Over the entire state in migrations; rare in eastern portions, rather common westward; a few are resident, but the majority move south in late fall, and return in early spring. It is a regular breeder in Dawes and Sioux counties, where it nests during May and June upon ledges on the faces of perpendicular cliffs.

356. *Falco peregrinus anatum* (Bonaparte)—DUCK HAWK.

A rare but regular migrant over the entire state. Lincoln, Omaha, West Point, Neligh, Dawes county. It probably breeds in this last

named locality where old and young birds were observed by Bruner Aug. 5 to 19, 1903, flying about the cliffs 8 miles west of Ft. Robinson, going in and out of a recess that may have been the nesting site.

357. *Falco columbarius* Linnaeus—PIGEON HAWK.

Not common, but found over the entire state during migrations. A few remain over winter. We have no records of its breeding in the state. Omaha, Lincoln, West Point, Neligh, Long Pine, Dawes and Sioux counties.

358. *Falco richardsonii* Ridgway—RICHARDSON MERLIN.

This small hawk seems to be rare in Nebraska at present, but is said by Aughey to have been formerly common and to have bred, but he gave no definite breeding record. Taken at West Point and Omaha by Bruner; and reported from southeastern Nebraska by Powell. The museum of the state university contains a specimen from the first locality.

360. \**Falco sparverius* Linnaeus—SPARROW HAWK.

Common in the eastern portion of the state; abundant westward; breeding throughout. Arrives early in April, departs in October.

360a. *Falco sparverius phalæna* Lesson—DESERT SPARROW HAWK.

A specimen from Sioux county taken in Jim creek canyon May 26, 1901, by M. A. Carriker, Jr., and sent to Witmer Stone, has been determined as "nearly typical" *phalæna*. Whether or not this is the breeding form there we cannot say. It was not suspected hitherto that we had this form in the state, and careful note was not taken of the Sioux county birds.

364. \**Pandion haliaetus carolinensis* (Gmelin)—OSPREY.

A regular migrant; most frequent along the Missouri and its tributaries, less so in the interior or middle, and almost or quite absent from the extreme western portion. Formerly bred along the Missouri river near Rockport, where Bruner observed birds carrying food to the nest, and may still do so occasionally in the northeastern part of the state. Numerous records.

FAMILY STRIGIDÆ—BARN OWLS

Without ear-tufts; eyes black; above gray and yellowish buff; below white more or less washed with buff and spotted with black.....

..... Barn Owl; Monkey-faced Owl.

365. \**Strix pratincta* Bonaparte—BARN OWL; MONKEY-FACED OWL.

Practically over the entire eastern half of state, but more common southward; becoming more generally dispersed with the settlement of new districts. Breeds over most of its range, selecting for the purpose burrows in banks, niches in rocky cliffs, hollow trees, nooks about buildings, etc. Lincoln, Omaha, West Point, Cherry county, Beatrice, Hebron, McCook.

## FAMILY BUBONIDÆ—HORNED OWLS, ETC.

1. Tarsus partly bare, twice as long as middle toe; wing  $5\frac{1}{2}$  to  $7\frac{1}{2}$  inches long. . . . . **Burrowing Owl.**
1. Tarsus fully feathered. . . . . (2)
  2. Head with conspicuous ear-tufts. . . . . (3)
  2. Head without ear-tufts. . . . . (11)
3. Wing 8 inches or less in length. . . . . (4)
3. Wing over 8 inches long. . . . . (7)
  4. Without ear-tufts; wing  $3\frac{1}{2}$  to 4 inches long. . . . . **Pygmy Owl.**
  4. With ear-tufts; wing over 4 inches long. . . . . (5)
5. Toes entirely naked to extreme base; ear-tufts small. . . . . **Flammulated Screech Owl.**
5. Toes distinctly feathered or bristled on upper side; ear-tufts rather large. . . . . (6)
  6. Above gray, irregularly marked with black; below gray, white, rusty and black, (gray phase); or above bright rusty brown with a few black streaks; below white streaked with black and barred with rusty brown, (red phase). . . . . **Screech Owl.**
  6. Very pale; above with a pale grayish buff predominating; black markings throughout very narrow and less numerous than in other forms. . . . . **Rocky Mountain Screech Owl.**
7. Size large, form robust; wing 14 to 18 inches long. . . . . (8)
7. Size medium, form slender; wing 11 to 13 inches long. . . . . (10)
  8. General color darker, much suffused with buffy and rufous. . . . . **Great Horned Owl.**
  8. General color lighter and grayer, with little or no buffy in plumage. . . . . (9)
9. Very pale throughout; the feet immaculate. . . . . **Arctic Horned Owl.**
9. Darker, but not buffy or ferruginous; the feet more or less spotted. . . . . **Western Horned Owl.**
10. Ear-tufts large and composed of 8 to 12 feathers. . . . . **American Long-eared Owl.**
10. Ear-tufts small, composed of few feathers. . . . . **Short-eared Owl.**
11. Wing 10 inches or under. . . . . (12)
11. Wing more than 10 inches long. . . . . (14)
  12. Wing 8 to 10 inches long; hawk-like in appearance. . . . . **American Hawk Owl.**
  12. Wing 5 to 8 inches long. . . . . (13)
13. Length 10 inches; above grayish brown with numerous white spots, especially on head. . . . . **Richardson Owl.**
13. Length 8 inches; above cinnamon brown; forehead with many streaks; hind head with few. . . . . **Saw-whet Owl.**
14. General color white, more or less barred with blackish. . . . . **Snowy Owl.**
14. General color gray or brown. . . . . (15)
15. Length 20 inches; eyes black; breast barred. . . . . **Barred Owl.**
15. Length 27 inches; eyes yellow; breast streaked. . . . . **Great Gray Owl.**

366. *\*Asio wilsonianus* (Lesson)—AMERICAN LONG-EARED OWL.

Distributed over the entire state in the wooded portions; common eastward, less frequent westward. Breeds throughout its range.

367. *\*Asio accipitrinus* (Pallas)—SHORT-EARED OWL.

Found over the whole of Nebraska where it is frequently very plentiful during migrations, and at times is to be met with in flocks of a dozen or more. Some remain over winter, and others in the summer—the latter breeding. A nest was found in Dodge county on the ground in tall dead prairie grass in April by Bruner. Several nesting records and numerous other records are at hand.

368. *\*Syrnium varium* (Barton)—BARRED OWL.

A not uncommon resident and breeder in the wooded districts of the eastern one-third of the state, but becoming rarer westward towards the eastern edge of Colorado and Wyoming where it seems to be absent. Numerous records.

370. *Scotiaptex nebulosa* (Gmelin)—GREAT GRAY OWL.

A northern species which rarely reaches the state in winter. It was reported once, Dec. 17, 1893, near Omaha by I. S. Trostler. A mounted specimen in a saloon at Long Pine is claimed to have been taken in that vicinity.

371. *Nyctala tengmalmi richardsoni* (Bonaparte)—RICHARDSON OWL.

The authority for including this northern owl as a Nebraska bird, was the taking of a live bird near Lincoln on Dec. 10, 1892, by some boys. It is now in the state university museum. It has been reported also as of casual occurrence in Iowa and Colorado.

372. *\*Nyctala acadica* (Gmelin)—SAW-WHET OWL.

A not rare species over the entire state, but most plentiful in winter. It has been found breeding at Nebraska City by M. A. Carriker, Jr.; is known to breed quite regularly across the river from Omaha and probably does on the Nebraska side also. It is reported as occurring at Beatrice, Lincoln, Omaha, West Point, Neligh, Long Pine, and in Sioux county.

373. *\*Megascops asio* (Linnaeus)—SCREECH OWL.

This is our most abundant and generally distributed owl. Both the gray and red color phases occur in most regions, but the gray greatly predominates. It breeds throughout its Nebraska range.

[373e. *Megascops asio maxwelliæ* (Ridgway)—ROCKY MOUNTAIN SCREECH OWL.

While we have no definite records of the occurrence of this Rocky Mountain form of the Screech Owl within the state, there is little doubt but that it occurs in the extreme western portions of Nebraska. It is reported as ranging along the foothills and adjacent plains from Colorado to Montana.]

375. \**Bubo virginianus* (Gmelin)—**GREAT HORNED OWL.**

The typical *virginianus*, or a race that approaches this form most nearly, occurs quite commonly over the eastern third of the state where it is resident and a regular breeder; westward merging into the next sub-species.

375a. \**Bubo virginianus pallescens* Stone—**WESTERN HORNED OWL.**

This horned owl is resident in western Nebraska, where it is common and spreads eastward in winter over the entire state. Breeds in Sioux and Dawes counties. West Point, Omaha, Lincoln. The Dusky Horned Owl referred to in Bruner's Notes on Nebraska Birds certainly belongs to this form.

375b. *Bubo virginianus arcticus* (Swainson)—**ARCTIC HORNED OWL.**

Rarely into the state during winter. The University of Nebraska collection contains a single specimen taken at West Point by Bruner. It was also reported once by L. Skow at Florence.

376. *Nyctea nyctea* (Linnaeus)—**SNOWY OWL.**

Coming regularly into Nebraska from the north in winter; found throughout the state and sometimes abundant. Numerous records.

377a. *Burnia ulula caparochi* (Mueller)—**AMERICAN HAWK OWL.**

This northern species winters south to northern United States, casually to Illinois, etc. Included as a Nebraska bird on the strength of a single specimen which was shot in Nov., 1891, at Raymond, by E. R. Mockett. The specimen was mounted and was seen by Bruner and August Eiche.

378. \**Speotyto cunicularia hypogæa* (Bonaparte)—**BURROWING OWL.**

A very common owl in the middle and western parts of the state, becoming rare eastward. Formerly common to the Missouri river; now almost absent from the more thickly settled portions of the eastern counties. Numerous records. Breeding throughout its range.

**EXTRALIMITAL:** A number of years ago Bruner saw a very small owl near Omaha which he cannot bring himself to believe was the Acadian—could it have been a Pygmy Owl, 379. *Glaucidium gnoma* Cassin, which species is found in Colorado? The Flammulated Screech Owl comes so close to our western border that it has been considered wise to at least include it in the synoptic table.

**ORDER XI. PSITTACI—PARROTS, MACAWS, PAROQUETS, ETC.****FAMILY PSITTACIDÆ—PARROTS AND PAROQUETS**

A small, green, long-tailed paroquet with yellow head and orange forehead and cheeks ..... **Carolina Paroquet.**

382. \**Conurus carolinensis* (Linnaeus)—**CAROLINA PAROQUET.**

Formerly a common bird in the Missouri river bottoms, especially southward, probably not extending north of the mouth of the Platte; now completely extinct in the state, having disappeared about 1866. They used to breed on an island in the Missouri river near Brownville. (See Furnas, Proc. N. O. V. III, 107.)

## ORDER XII. COCCYGES—CUCKOOS, KINGFISHERS, ETC.

- A. Toes, two in front, two behind; bill curved downwards.....Cuculidæ.  
 A. Toes, three in front, one behind; bill straight.....Alcedinidæ.

## FAMILY CUCULIDÆ—CUCKOOS

1. Bill wholly blackish; tail narrowly white-tipped; wings slightly cinnamon  
.....Black-billed Cuckoo.
1. Bill mostly yellow below; tail broadly white-tipped; wings extensively  
cinnamon.....(2)
  2. Smaller, with smaller bill (wing under  $5\frac{1}{2}$ , tail under 6, culmen under  
1 inch).....Yellow-billed Cuckoo.
  2. Larger, with larger bill (wing over  $5\frac{1}{2}$ , tail over 6, culmen 1 inch  
or more).....California Cuckoo.

387. \**Coccyzus americanus* (Linnaeus)—YELLOW-BILLED CUCKOO.

Eastern half of state, a common summer resident and breeder, arriving the second week in May, breeding in June or early July, departing early in September. Omaha, Lincoln, Beatrice, West Point, Neligh, Niobrara valley, Holt county, Cherry county, Bloomington.

388. \**Coccyzus erythrophthalmus* (Wilson)—BLACK-BILLED CUCKOO.

Entire state, but rather uncommon; dates practically as preceding; breeding wherever present. Omaha, Lincoln, Beatrice, West Point, Neligh, Niobrara valley, Long Pine, North Platte, Sioux county.

EXTRALIMITAL: 387a. *C. e. occidentalis* Ridgway, the California Cuckoo, a western race of the Yellow-billed, is the form occurring throughout Colorado to within a few miles of the eastern boundary of the state, and any yellow-billed cuckoo found in western Nebraska is very apt to be *occidentalis*.

## FAMILY ALCEDINIDÆ—KINGFISHERS

A large, blue backed, crested kingfisher, white below and with a blue band across the breast.....Belted Kingfisher.

390. \**Ceryle alcyon* (Linnaeus)—BELTED KINGFISHER.

Common over the entire state; breeding in sand and clay banks. Arrives first week in April, breeds early in June, lingers until late fall, and a few remain the entire winter where there is open water.

## ORDER XIII. PICI—WOODPECKERS, WRYNECKS, ETC.

## FAMILY PICIDÆ—WOODPECKERS

1. Back entirely dark, without white marks, but rump sometimes white..(2)
1. Back conspicuously marked with white or yellowish.....(7)
  2. Back shining blackish (3)—brownish with black bars; under parts  
spotted.....(6)
3. Head crested, the crest bright scarlet, or partly so; under parts black;  
size of crow.....Northern Pileated Woodpecker.

3. Head not crested; under parts not entirely black; much smaller than a crow. .... (4)
4. Under parts of stiff reddish feathers; elsewhere shining bronze-black, except for a grayish collar and a red face. **Lewis Woodpecker.**
4. Under parts of soft feathers; without red on breast or belly. .... (5)
5. Secondaries entirely white; rump white; head and neck red in adult, brownish in young; toes 4; flanks not barred. .... **Red-headed Woodpecker.**
5. Wings black, spotted with white; rump black; crown orange in male; toes 3; flanks barred. .... **Arctic Three-toed Woodpecker.**
5. Wings black, spotted with white, a large white patch on bend of wing; rump white; head black with two white stripes on sides and a red one on throat; toes 4; flanks barred; belly light yellow. ....  
..... **Williamson Sapsucker, male.**
6. Under surface of wings and tail yellow; throat brownish; male with a black malar stripe. .... **Northern Flicker.**
6. Under surface of wings and tail orange-red; throat ashy; male with a red malar stripe. .... **Red-shafted Flicker.**
7. Back black marked with white (9)—back mottled, black and yellowish; belly, yellowish. .... (8)
8. Nape whitish; male with a black stripe from bill to chest separating the red throat from the white cheeks; female with whole chin and throat white. .... **Yellow-bellied Sapsucker.**
8. Nape more or less red; male with red of throat extending in middle to the cheeks, thus obliterating the black stripe except at ends; female with throat largely red. ....  
..... **Red-naped Sapsucker.**
9. Back black with conspicuous, regular, white cross-bars. .... (10)
9. Back with a large, broad, white streak running lengthwise, but no cross-bars. .... (12)
10. Outer tail feathers conspicuously entirely white; toes 3; crown yellow in male. .... **American Three-toed Woodpecker.**
10. Outer tail feathers with black; toes 4; much barred with black and white. .... (11)
11. Under parts yellowish; head brown, without decided white or red. ....  
..... **Williamson Sapsucker, female.**
11. Under parts reddish; head grayish white with more or less red on crown. .... **Red-bellied Woodpecker.**
12. Under tail feathers white, barred with black; smaller, wing under 4 inches. .... (13)
12. Under tail feathers white, not barred; larger, wing over 4½ inches. .... (14)
13. Middle and greater wing-coverts conspicuously spotted with white. ....  
..... **Northern Downy Woodpecker.**
13. Middle and greater wing-coverts plain black or but slightly spotted. ....  
..... **Batchelder Woodpecker.**
14. Middle and greater wing-coverts plain black or the white

- spots few; below pure white; wing over 5 and tail up to 4 inches. . . . . **Rocky Mountain Hairy Woodpecker.**
14. Middle and greater wing-coverts conspicuously white spotted; lores black or mostly black. . . . . (15)
15. Larger, wing over 5, tail  $3\frac{1}{2}$  to 4, culmen  $1\frac{1}{2}$  to  $1\frac{3}{4}$  inches; paler. . . . . **Northern Hairy Woodpecker.**
15. Smaller, wing not over 5, tail  $3\frac{1}{2}$  to  $3\frac{3}{4}$ , culmen under  $1\frac{1}{2}$  inches. . . . . **Hairy Woodpecker.**

393. **\*Dryobates villosus** (Linnaeus)—**HAIRY WOODPECKER.**

A common resident over at least the eastern half of state, breeding in early May. Omaha, Lincoln, Peru, West Point, Neligh, Rock county, Cherry county.

- [393a. **D. v. leucomelas** (Boddaert), the Northern Hairy Woodpecker, is the form breeding north of the United States and reaching the northern states in winter. Large specimens of the Hairy Woodpecker taken at Omaha in winter have been referred to this form by Skow and Trostler, but probably represent only the maximum of *villosus*.]

393e. **\*Dryobates villosus monticola** Anthony—**ROCKY MOUNTAIN HAIRY WOODPECKER.**

A common resident in Sioux county, entirely replacing the eastern form. To this form must be referred all the records given as Cabanis Woodpecker in former Nebraska reports. A dozen or more specimens from Sioux county all agree with this form rather than with *hyloscopus*.

394b. **\*Dryobates pubescens homorus** (Cabanis)—**BATCHELDER WOODPECKER.**

An uncommon resident in Sioux county, breeding in willow stubs; not so common as the corresponding variety of the Hairy. (Formerly referred to as Gairdner's Woodpecker.)

394c. **\*Dryobates pubescens medianus** (Swainson)—**NORTHERN DOWNY WOODPECKER.**

A very common resident in the eastern third of the state, breeding commonly; rare and local west of this to about the middle of the state. Omaha, Lincoln, Beatrice, Peru, Dakota City, West Point, Neligh, Niobrara, Long Pine.

400. **Picoides arcticus** (Swainson)—**ARCTIC THREE-TOED WOODPECKER.**

A northern species making its way south in winter to the northern states. Has been taken three times in the state, twice at Omaha, once by I. S. Trostler, Dec. 15, 1895 and again by F. J. Brezee, and at Dakota City by Wallace Bruner.

402. **Sphyrapicus varius** (Linnaeus)—**YELLOW-BELLIED SAPSUCKER.**

A migratory woodpecker, found only in the eastern part of the state and common only in the Missouri bottoms. It has frequently been seen in various localities in summer but its nest has never been



found and its breeding is still open to question. Omaha, Peru, West Point—in summer. Migratory at Lincoln.

405. *Ceophloeus pileatus abieticola* Bangs—NORTHERN PILEATED WOODPECKER.

This magnificent woodpecker was formerly not uncommon in the more heavily wooded portions of the Missouri bottoms. Both L. Skow and Bruner have seen it in the vicinity of Rockport, and Bruner also found it not rare about Tekamah years ago. The last Nebraska record is I. S. Trostler's, from near Omaha, May 20, 1895, a bird seen. It probably used to breed in these regions, for there have been noted in the past numerous indications of what was undoubtedly the work of this bird in building its nesting sites. If now present at all it is very rare. The Peru record of the "Ivory-billed" refers to this species.

406. *Melanerpes erythrocephalus* (Linnaeus)—RED-HEADED WOODPECKER.

Common throughout the whole state. Locally abundant and increasing in numbers. It winters but is rare at this season, in the southern part of the state, the bulk appearing about the first of May and remaining till late in October. Breeding throughout its range.

408. *Asyndesmus torquatus* (Wilson)—LEWIS WOODPECKER.

Common summer resident and breeder in the pine-covered canyon districts of Sioux, Dawes, northern Sheridan, and Scott's Bluff counties; in winter east to the eastern limits of the pines or about Long Pine and Valentine.

409. *Centurus carolinus* (Linnaeus)—RED-BELLIED WOODPECKER.

Found locally in eastern Nebraska, especially southward; breeding uncommonly and rarely remaining in winter. Omaha, Nebraska City, Lincoln, Beatrice, West Point. Bruner reports seeing a straggler once in Monroe canyon, Sioux county.

412a. *Colaptes auratus luteus* Bangs—NORTHERN FLICKER.

Common all over the state, abundant eastward, breeding throughout, and only in part migratory.

413. *Colaptes cafer collaris* (Vigors)—RED-SHAFTED FLICKER.

A common resident over the entire state, abundant westward, very common eastward in winter but becoming much less so in summer. Sioux and Cherry counties, Lincoln, Beatrice, Omaha.

EXTRALIMITAL: It is barely possible that the American Three-toed Woodpecker, 401. *P. americanus* Brehm, may reach our state in winter very rarely, but there is no record as yet. 402a. *S. v. nuchalis* Baird, the Red-naped Sapsucker, is the western variety of the Yellow-bellied Sapsucker. It is common in eastern Colorado and Wyoming and has been taken in western Kansas, so may be expected in western Nebraska also. Williamson Sapsucker, 404. *S. thyroideus* (Cassin), is common in both Colorado and Wyoming,

breeding from 5,000 to 10,000 feet, and migrating commonly in the foothills even to Cheyenne, so it may occasionally reach Nebraska also during migrations.

#### ORDER XIV. MACROCHIRES—GOATSUCKERS, SWIFTS, ETC.

- A. Bill slender and long, gape narrow; plumage metallic. . . . . **Trochilidæ.**
- A. Bill short and broad at base; gape very wide; plumage non-metallic. (B)
  - B. Middle toe pectinated and longer than others. . . . . **Caprimulgidæ.**
  - B. Middle toe not pectinate nor longer than others. . . . . **Micropodidæ.**

#### FAMILY CAPRIMULGIDÆ—GOATSUCKERS, NIGHTHAWKS, ETC.

- 1. Middle of primaries with a conspicuous white bar; tail forked; rictal bristles very small. . . . . (2)
- 1. Middle of primaries without a white spot; tail rounded or square; rictal bristles long. . . . . (3)
  - 2. Darkest. Black markings prominent above, much in excess of the brown and gray mottlings, the blackish bars below mostly complete. . . . . **Nighthawk.**
  - 2. Paler. Gray and rufous in excess of dark color above, the white on wing, tail and throat more extensive, below often washed with rusty. . . . . **Western Nighthawk**
  - 2. Palest. Pale silvery gray predominating above, the white below greatly in excess of the narrow, irregular or broken, dark bars, and little or no rufous feathers . . . . . **Sennett Nighthawk.**
- 3. Tarsus feathered; tail rounded, the 3 outer feathers white tipped for over an inch. . . . . **Whippoorwill.**
- 3. Tarsus naked; tail even, the 3 outer feathers white tipped for less than an inch . . . . . (4)
  - 4. Darker, the ground color of upper parts velvety gray, irregularly barred with black; below barred with blackish and buffy; chin and cheeks blackish . . . . . **Poorwill.**
  - 4. Paler, the ground color of upper parts much lighter, largely frosty white, with the dark markings fewer and sharper; the bars beneath finer and paler, less conspicuous; chin and cheeks faded brown. . . . . **Frosted Poorwill.**

#### 417. \**Antrostomus vociferus* (Wilson)—WHIPPOORWILL.

Uncommon summer resident and breeder along the Missouri river, more rarely westward over about the eastern half of state. Omaha, Peru, Nebraska City, Neligh—breeding. Noted also, but not breeding, at Lincoln, West Point, Thomas county—rare. Arrives the last week in April, breeds from the middle of May to well into June, leaves late in September.

#### 418. \**Phalaenoptilus nuttallii* (Audubon)—POORWILL.

Western part of state, common; breeding in the canyons of Sioux county and east at least to Long Pine canyon, probably across the state northward.

420. \**Chordeiles virginianus* (Gmelin)—NIGHTHAWK.

The nighthawks breeding along the Missouri and a little westward are very clearly of this form, which occurs during migration over the eastern half of the state, but is not nearly so abundant as is *sennetti* westward. Arrives the second week in May, breeds in early June, departs before the middle of September. Omaha, Peru, Beatrice, Lincoln, West Point.

420a. \**Chordeiles virginianus henryi* (Cassin)—WESTERN NIGHTHAWK.

This rufous form is the commoner one in Sioux county, though specimens nearer *sennetti* also occur there. During migrations it extends eastward about half way across the state, flocking with *sennetti*. Indian creek, Warbonnet canyon, Harrison—breeding.

420c. \**Chordeiles virginianus sennetti* (Coues)—SENNETT NIGHTHAWK.

This is the nighthawk of the whole western two-thirds of the state except in Sioux county where it is mostly replaced by and runs into *henryi*; it occupies this region to the complete exclusion of the other forms during the breeding season. It is the nighthawk of the sand-hills, where its conspicuous paleness makes its identity unmistakable, but eastward it intergrades with *virginianus* and is more difficult to distinguish. Antelope, Holt, Rock, Cherry, Dawes, Thomas, Dundy, Redwillow counties.

EXTRALIMITAL: 418a. *P. n. nitidus* Brewster, the Frosted Poorwill, occurs as a summer resident in western Kansas and eastern Colorado, and may reasonably be expected in extreme southwest Nebraska, though there is as yet no specimen from that locality.

## FAMILY MICROPODIDÆ—SWIFTS

1. Sooty, paler below, the throat gray, wings black; tail rounded, spine tipped. . . . . Chimney Swift.
1. Black, under parts except the sides white; tail forked, not spiny . . . . . White-throated Rock Swift.

423. \**Chætura pelagica* (Linnaeus)—CHIMNEY SWIFT.

Eastern portions of state only, west along northern border to Ne-ligh, O'Neill, Atkinson, and probably Long Pine, but rare west of the 98th meridian. Arriving third week in April, breeding the latter part of May, and departing second week in September. Locally very abundant. Omaha, Lincoln, Beatrice, Peru, West Point, Niobrara.

425. \**Aeronautes melanoleucus* (Baird)—WHITE-THROATED ROCK SWIFT.

Sioux, Scott's Bluff, and Dawes counties, common summer resident and breeder in the high perpendicular cliffs of that region. (See Carriker, Proc. N. O. U., III, pp. 81-83.)

## FAMILY TROCHILIDÆ—HUMMINGBIRDS

1. Throat metallic red; males (2)—not wholly metallic red; females . . . (4)
2. Tail forked; outer primary broad, end turned inward; back golden green. . . . . Ruby-throated Hummingbird.

2. Tail rounded; outer primary narrow, acute. . . . . (3)
3. Back golden green; end of outer primary bowed outward; throat pink. . . . . **Broad-tailed Hummingbird.**
3. Back and tail mostly chestnut; end of outer primary bowed inward; throat coppery. . . . . **Rufous Hummingbird.**
4. Tail without rufous, doubly rounded, three outer feathers white tipped, black barred. . . . . **Ruby-throated Hummingbird.**
4. Tail with rufous, rounded, four outer feathers white tipped, middle pair greenish. . . . . (5)
5. Outer tail feather under 1 inch long and only  $\frac{1}{4}$  inch broad, the rufous equalling or exceeding the black. . . . . **Rufous Hummingbird.**
5. Outer tail feather over 1 inch long and  $\frac{1}{4}$  inch broad, the rufous less extensive than the black. . . . . **Broad-tailed Hummingbird.**

428. **\*Trochilus colubris** Linnaeus—**RUBY-THROATED HUMMINGBIRD.**

Eastern Nebraska, not recorded west of the 98th meridian, breeding quite commonly in the ravines of the Missouri river bluffs. Arrives second week in May, breeds in June, departs late in September. Omaha, Beatrice, Gresham, Lincoln, West Point.

432. **Selasphorus platycercus** (Swainson)—**BROAD-TAILED HUMMINGBIRD.**

During the summer of 1891, Bruner saw on several occasions on the Pine ridge in Sioux and Dawes counties a species of hummingbird which he identified as this one, and a later intimate acquaintance with it in Colorado confirmed his identification. The hummingbird reported by J. M. Bates in Bruner's list from Cherry county (Valentine) according to his own judgment also belongs here since he later identified the Broad-tailed at Bassett, Sept. 10, 1899, thus establishing its range half way across the state. (See Proc. N. O. U., I, pp. 16-17.) In the adjacent states of Wyoming and Colorado this species is common.

**EXTRALIMITAL:** 433. *S. rufus* (Gmelin), the Rufous Hummingbird, is a western species which is fairly common in Colorado and has been taken at Cheyenne, Wyo., only about 60 miles from the Nebraska line.

## ORDER XV. PASSERES—PERCHING BIRDS

- A. Tarsus with its hinder edge compressed. . . . . (C)
- A. Tarsus with its hinder edge rounded. . . . . (B)
  - B. Bill hooked at tip and with bristles at base; hind claw curved. . . . . **Tyrannidæ.**
  - B. Bill not hooked at tip and without bristles; hind claw nearly straight. . . . . **Alaudidæ.**
- C. Primaries apparently only nine, bill not hooked at tip. . . . . (D)
- C. Primaries apparently ten, or else bill hooked at tip. . . . . (H)
  - D. Bill very short and broad with gape more than twice as long as culmen. . . . . **Hirundinidæ.**
  - D. Bill various, but gape never twice as long as culmen. . . . . (E)

- E. Bill conoid, or if slender, the angle of gonys before the nostril.....(G)
- E. Bill not conoid, and angle of gonys not before the nostril.....(F)
  - F. Hind claw long and nearly straight; tertials nearly as long as primaries.....**Motacillidæ.**
  - F. Hind claw short and curved; tertials not nearly as long as primaries.....**Mniotiltidæ.**
- G. Bill rather long, often longer than head, without a notch at tip, or bristles at base.....**Icteridæ.**
- G. Bill often notched at tip, shorter than head, usually with rictal bristles.....**Fringillidæ.**
- G. Bill stout, toothed near middle of cutting edge of upper mandible..
  - .....**Tanagridæ.**
  - H. Front of tarsus not divided into scales except at extreme lower portion.....(P)
  - H. Front of tarsus covered with transverse four-sided scales.....(I)
- I. Bill very strongly hooked and notched at tip.....**Laniidæ.**
- I. Bill not strongly hooked, or not hooked at all.....(J)
  - J. Tarsus not longer than middle toe with claw, bill short, depressed.....**Ampelidæ.**
  - J. Tarsus longer than middle toe with claw, or else bill elongated, not depressed.....(K)
- K. Tail feathers stiff and pointed at tips.....**Certhiidæ.**
- K. Tail feathers not stiff nor especially pointed.....(L)
  - L. Nasal feathers erect or inclined backward, not covering the nostrils.....(M)
  - L. Nasal feathers directed forward, usually covering the nostrils..(N)
- M. Back olive-greenish, bill slightly hooked at tip.....**Vireonidæ.**
- M. Back not olivaceous; bill not hooked.....**Troglodytidæ.**
  - N. Wing over four inches long.....**Corvidæ.**
  - N. Wing less than four inches long.....(O)
- O. Bill without a notch, and rather conoid.....**Paridæ.**
- O. Bill notched and very slender.....**Sylviidæ (Poliptilinae).**
  - P. Without rictal bristles; nostrils linear; tail very short..**Cinclidæ.**
  - P. With distinct rictal bristles; nostrils oval; tail normally developed.....(Q)
- Q. Wing less than three inches.....**Sylviidæ (Sylviinae, Regulinae).**
- Q. Wing over three inches.....**Turdidæ.**

#### FAMILY TYRANNIDÆ—FLYCATCHERS

- 1. Tail very long, over 7 inches, forked for  $\frac{1}{2}$  its length; ashy, with scarlet sides.....**Scissor-tailed Flycatcher.**
- 1. Tail shorter, under 5 inches, only slightly forked, or square.....(2)
  - 2. Larger, wing  $3\frac{1}{4}$  to 5 inches long.....
  - 2. Smaller, wing  $3\frac{1}{4}$  or less, down to  $2\frac{1}{4}$ .....(12)
- 3. Crown with a concealed orange patch (4)—without a bright colored patch.....(6)

4. Under parts whitish, without yellow; upper parts black; tail white tipped ..... Kingbird.
4. Under parts yellow except ashy throat and breast; above ashy; tail not white tipped. .... (5)
5. Tail slightly forked, its outer feather with entire outer web and half of the quill whitish; head, neck, and breast light ashy, that on breast lighter than that on back, the chin and throat pale ashy; wings blackish narrowly edged with paler, the tip of outer primaries narrowed gradually for some distance. . . . Arkansas Kingbird.
5. Tail rounded, its outer feather with quill brown and only outer edge of outer web whitish; head, neck, and breast dark ashy, breast as dark as back, chin abruptly whitish; wings brownish, broadly edged with paler, the tips of outer primaries narrowed abruptly near the end. .... Cassin Kingbird.
6. Under parts with throat and breast ashy changing to sulphur yellow on belly and under tail-coverts; wings and tail conspicuously marked with chestnut. .... (7)
6. Under parts not as above, without decided yellow; no chestnut on wings or tail. .... (8)
7. Throat and chest dark ashy, abruptly changing to bright yellow; above olivaceous brown; edgings on secondaries and coverts grayish, the chestnut on inner web of tail feathers extensive, the fuscous stripe very narrow and not widening at tip. .... Great-crested Flycatcher.
7. Throat and chest very pale ashy, former almost white, changing gradually to pale yellow; above grayish brown; edgings on secondaries and coverts yellowish, the chestnut on inner web of tail feathers narrower, the fuscous stripe wider and broadening at tip across the feather. .... Ash-throated Flycatcher.
8. Bill narrow and entirely black; wing 5 times as long as tarsus... (9)
8. Bill broad, lower mandible more or less pale; wing 6 times as long as tarsus. .... (10)
9. Belly whitish; elsewhere olive-gray, the tail dusky ..... Phoebe.
9. Belly cinnamon brown; elsewhere brownish gray, the tail black. .... Say Phoebe.
10. Wing  $3\frac{1}{4}$  to  $4\frac{3}{8}$ , averaging 4 inches; above dark olivaceous, throat whitish, breast and sides dull grayish, middle of belly abruptly yellowish white in a lengthwise streak. .... Olive-sided Flycatcher.
10. Wing  $3\frac{1}{4}$  to  $3\frac{3}{4}$  inches; belly without a defined yellowish white streak. .... (11)
11. Upper parts lighter, more olivaceous, belly more whitish, breast less olive gray; lower mandible yellowish ..... Wood Pewee.
11. Upper parts darker, more fuscous; belly more clouded, breast much more olive gray, generally solidly of that color; lower mandible brownish. .... Western Wood Pewee.
12. Under parts sulphur yellow, that on throat, breast, and sides

- tinged with olive green; above dull olivaceous, not tinged with brown; lower mandible pale. . . . . (13)
12. Under parts dull whitish, somewhat tinged with yellow on belly but never on throat. . . . . (14)
13. Under wing-coverts pale yellowish, wing-bands yellowish white; coloration purer and brighter, above more greenish olive, below purer yellow, the breast shaded with olive; tail longer, generally over  $2\frac{1}{4}$  inches. . . . . **Yellow-bellied Flycatcher.**
13. Under wing-coverts pale buffy, deeper on edge of wing, wing-bands buffy gray; coloration duller and more clouded, above more grayish olive, below pale dull yellow faintly clouded with dull grayish brown on the breast; tail shorter, generally under  $2\frac{1}{4}$  inches. . . . . **Western Flycatcher.**
14. Bill moderately wide, at nostrils over  $\frac{1}{2}$  the length. . . . . (15)
14. Bill very narrow, at nostrils less than  $\frac{1}{2}$  as wide as long. . . . . (18)
15. Above uniform olive greenish not tinged with brown; wing-bars and eye-ring tawny; below white with breast grayish, and together with sides, washed with sulphur yellow; lower mandible whitish. . . . . **Acadian Flycatcher.**
15. Above olivaceous tinged with brown; wing-bars and eye-ring buffy whitish; below white, breast grayish, and, together with sides, very slightly yellowish; lower mandible darker. . . . . (16)
16. Smaller, wing  $2\frac{3}{4}$  or less long; tail slightly forked; upper parts more grayish, rather ashy; wing-bars broader, dull white; eye-ring grayish white; under mandible dusky. . . . . **Least Flycatcher**
16. Larger, wing over  $2\frac{3}{4}$ , up to  $2\frac{1}{2}$  long; tail even or rounded; upper parts more brownish; wing-bars narrower, tinged with gray or buffy; eye-ring buffy white; under mandible paler. . . . . (17)
17. Above duller, more fuscous, breast more ashy and lower parts less yellowish; wing-bars duller, less conspicuous, more grayish white; bill longer and very slightly narrower, tarsus longer. **Traill Flycatcher.**
17. Above clearer, more olivaceous, lower parts more yellowish; wing-bars more olivaceous white; bill and tarsi shorter. . . . . **Alder Flycatcher.**
18. Outer web of outer tail feather not paler than inner; more olivaceous, throat grayish, eye-ring and wing-bars soiled whitish, below more yellowish; lower mandible brown. . . . . **Hammond Flycatcher.**
18. Outer web of outer tail feather abruptly paler than inner, dull whitish; duller and grayer, throat, eye-ring and wing-bars whitish, lower parts hardly yellowish; lower mandible brown at tip only. . . . . **Wright Flycatcher.**

443. **Muscivora forficata** (Gmelin)—SCISSOR-TAILED FLYCATCHER.

Accidental. The only known instance of the occurrence of this bird in Nebraska is a single specimen seen south of Lincoln in the fall of 1872 by Bruner. There is no doubt as to the correct identification

of the species, as the view was very good and the bird known by the observer.

444. *\*Tyrannus tyrannus* (Linnaeus)—KINGBIRD.

Abundant over entire state in summer, arriving the last few days in April or in early May, breeding from middle May through June, and departing the second week in September. Breeds throughout the state.

447. *\*Tyrannus verticalis* Say—ARKANSAS KINGBIRD.

Present over entire state; an abundant breeder westward in the semi-arid districts, east to about the 100th meridian, and in the Niobrara valley to its mouth; eastwardly rare, occurring only as a migrant. Sioux, Cheyenne, and Dundy counties, east to Niobrara, Valentine, Broken Bow, Holdrege, etc.—breeding. Migrant at Omaha, Lincoln, Ashland, Fremont, West Point, Neligh, etc.

452. *\*Myiarchus crinitus* (Linnaeus)—GREAT-CRESTED FLYCATCHER.

A common summer resident and breeder along the Missouri and in the larger timber of its principal tributaries in eastern, and especially southeastern, Nebraska. Richardson county, Brownville, Omaha, Peru, up the Blue to Beatrice, Milford, along Salt creek to Lincoln, up the Elkhorn to West Point—breeding. Arrives first week in May, breeds in June, departs early in September.

456. *\*Sayornis phoebe* (Latham)—PHOEBE.

More eastern portions of state; abundant summer resident and breeder. Omaha, Peru, Lincoln, Beatrice, West Point, Neligh, Long Pine, Cherry county—breeding. Arrives about third week in March, breeds from middle April to middle July, departs early in September.

457. *\*Sayornis saya* (Bonaparte)—SAY PHOEBE.

Like the Arkansas Kingbird this species is practically confined to the semi-arid portions of the state, but even more decidedly so. Very common summer resident and breeder, Sioux and Dundy counties, east to Chadron, Valentine, and Rock, Custer, Dawson, and Buffalo counties. Migrant in Holt county and once at Lincoln. Extending slowly eastward.

459. *Nuttallornis borealis* (Swainson)—OLIVE-SIDED FLYCATCHER.

Rather rare migrant over the state, breeding north of Nebraska. Sioux county, West Point, Lincoln, Gresham. Passes first week in May and late in September.

461. *\*Contopus virens* (Linnaeus)—WOOD PEWEE.

Eastern edge of state, common summer resident and breeder, arriving second week in May, breeding in June, and departing late in August. Omaha, Peru, Lincoln, Beatrice, Weeping Water, Nebraska City, Dakota City, etc.

462. *Contopus richardsonii* (Swainson)—WESTERN WOOD PEWEE.

Common summer resident in Sioux County, east, but not common,



to Dismal river, Thomas county. Aughey reports it also from Sidney and the Wood river, the latter probably in Custer or Dawson counties. Very likely breeds in the state.

463. *Empidonax flaviventris* Baird—YELLOW-BELLIED FLYCATCHER.

Aughey states that this flycatcher is present sparingly in eastern Nebraska and that he has known it to breed along the Missouri, but he does not give his evidence, and the latter statement is probably a mistake. He shot one near Dakota City in July, 1870. It has been noted once at both Lincoln and West Point as a migrant by Bruner. It is, however, quite rare.

465. *\*Empidonax virescens* (Vieillot)—ACADIAN FLYCATCHER.

Whole of state, breeding commonly along the Missouri, less commonly along the lower Platte and the Elkhorn. Omaha, West Point, Sioux county. Arrives second week in May, breeds in June, departs early in September.

466. *\*Empidonax traillii* (Audubon)—TRAILL FLYCATCHER.

Entire state, common, arrives first week in May or a day or so previously, breeds in June, and departs early in September. Omaha, Peru, Nebraska City, Lincoln, Neligh, Sioux county.

467. *\*Empidonax minimus* Baird—LEAST FLYCATCHER.

Eastern Nebraska rather rare; breeding along the Missouri river. Omaha, Dakota City—breeding. Migrant at Lincoln, West Point, and Neligh. Dates same as preceding.

EXTRALIMITAL: 448. *T. vociferans* Swainson, the Cassin Kingbird, is a common summer resident in Colorado down to the foothills and is present, though uncommon, at Cheyenne, Wyo. It may straggle to western Nebraska during migration. 454. *M. cinerascens* (Lawrence), the Ash-throated Flycatcher, has been taken at Cheyenne, Wyo. 464. *E. difficilis* Baird, the Western Flycatcher, represents the Yellow-bellied in the western United States. It is common in summer in Colorado, occurs in eastern Wyoming, and may reach western Nebraska during migrations. 466a. *E. t. alnorum* Brewster, the Alder Flycatcher, is a scarcely distinct form occurring in eastern United States west to Michigan, but specimens from Sioux county, in extreme northwest Nebraska, have been identified at Washington as *alnorum*. Owing to the extreme distance from the limits of its accepted range it is not included as a Nebraska bird. Two small western Empidonaces, 468. *E. hammondi* (Xantus), the Hammond Flycatcher, and 496. *E. wrightii* Baird, the Wright Flycatcher, especially the latter species, are apt to straggle into western Nebraska during migrations. Both occur in Colorado and Wyoming, *wrightii* abundantly and even to Cheyenne.

FAMILY ALAUDIDÆ—LARKS

1. Larger, wing  $4\frac{1}{2}$  to  $4\frac{3}{4}$ , averaging  $4\frac{3}{4}$  inches, upper parts darker, more rufescent and less pinkish.....(2)

1. Smaller, wing 4 to 4½, averaging 4½ inches; upper parts paler, more grayish and pinkish. .... (3)
2. Throat, forehead, and line over eye deep yellow, this color often suffusing rest of crown, occiput and auriculars. **Horned Lark.**
2. Throat pale yellow at least centrally, forehead, line over eye, and rest of pale areas on head white. .... **Hoyt Horned Lark.**
3. Throat yellowish white, the line over eye usually yellowish; upper parts paler, more sandy brown than blackish; nape, upper tail-coverts, and bend of wing more pinkish. .... **Desert Horned Lark.**
3. Throat pale yellow, the line over eye usually all white; upper parts darker, more blackish than brown; nape, upper tail-coverts and bend of wing less pinkish. .... **Prairie Horned Lark.**

474. *Otocoris alpestris* (Linnaeus)—**HORNED LARK.**

The typical form, breeding from Labrador to Hudson bay, in winter descends chiefly along the Atlantic coast, but occasionally in the Mississippi valley also to Illinois. A single specimen, taken at Lincoln by a student in the taxidermy class (full data unfortunately lost) has been identified by Oberholser as typical *alpestris*. This record extends the known winter range of this species considerably westward.

474b. *\*Otocoris alpestris praticola* Henshaw—**PRAIRIE HORNED LARK.**

Eastern and especially southeastern Nebraska; common resident; in summer rare west of the 97th meridian, in winter straggling westward half way across the state. Breeds from late March to well into July. Omaha, Peru, Lincoln, Beatrice, West Point—breeding.

474c. *\*Otocoris alpestris leucolæma* (Coues)—**DESERT HORNED LARK.**

Greater portion of state especially westward; an abundant resident, breeding east to at least the 99th meridian and northward even farther, in winter over whole state but uncommon eastward. Sioux, Cheyenne, Dundy, and Cherry counties, to Niobrara, Neligh, etc.—breeding. Under this name are included those specimens referable to Oberholser's form *enthymia* which he has identified from specimens taken at Valentine and Harrison.

474k. *Otocoris alpestris hoyti* Bishop—**HOYT HORNED LARK.**

Regular winter visitant, occurring over the entire state, never so common as the two preceding forms and appearing usually in February. Breeds far north, from Hudson bay to the Mackenzie river and south to Lake Athabasca. Oberholser has identified it from Papillion, Platte Center, and Lincoln. It is here that most, if not all, of the previous Nebraska records of the typical *alpestris* and of the large so-called "*leucolæma*" (= *arcticola*) belong. Omaha, West Point, Covington.

**FAMILY CORVIDÆ—JAYS, CROWS, MAGPIES, ETC.**

1. Color wholly black (2)—mostly blue (5)—neither wholly black nor mostly blue. .... (9)

2. Throat feathers oval, blended; bill under 2 inches, wing 12 to 14 inches. .... **Crow.**
2. Throat feathers narrow, pointed, separated; bill over 2, wing over 13 inches. .... (3)
3. Wing 13 to 14 inches long; hind neck with feathers white at base. .... **White-necked Raven.**
3. Wing 16 to 18 inches long; hind neck feathers without white. .... (4)
  4. Larger, bill  $2\frac{1}{2}$  to  $3\frac{1}{2}$ , averaging about 3 inches, over 1 inch deep at nostrils. .... **Northern Raven.**
  4. Smaller, bill  $2\frac{1}{2}$  to 3, averaging  $2\frac{1}{2}$  inches, under 1 inch deep at nostrils. .... **American Raven.**
5. Head crested (6)—not crested. .... (8)
  6. Crest purplish blue, throat white with a black collar and frontlet; wings and tail blue. .... **Blue Jay.**
  6. Crest, head, neck, and upper chest and back blackish or brownish; rump, belly, wings, and tail dark blue. .... (7)
7. White spot over eye smaller, streaks on forehead light blue, (both sometimes indistinct); greater wing-coverts not barred. .... **Black-headed Jay.**
7. White spot over eye conspicuous, streaks on forehead bluish white or pure white (never indistinct); greater wing-coverts barred with black. .... **Long-crested Jay.**
8. Wholly dull blue, brighter on head, duller on belly, throat white-streaked. .... **Pinion Jay.**
8. Below gray, under tail-coverts blue, with streaks on breast and tinge of belly same color; back grayish blue with crown, nape, wings, and tail pure blue. .... **Woodhouse Jay.**
9. Black; shoulders, lower back, under parts, and wing tips white; tail 9 to 12 inches. .... **Magpie.**
9. Gray; wings black, tail white with middle feathers black; tail 5 inches. .... **Clarke Nutcracker.**
9. Gray; head mostly white, lower parts ashy, tail narrowly white tipped. (10)
  10. Occiput and hind crown blackish, this reaching to (often encircling) the eye; in young crown colored as back. .... **Canada Jay.**
  10. Occiput only plumbeous gray, this not reaching to eye; young with crown white tinged with grayish brown. .... **Rocky Mountain Jay.**

475. *\*Pica pica hudsonica* (Sabine)—MAGPIE.

Resident. Formerly present over entire state (Norfolk, West Point, Beatrice, Plattsmouth, Dixon county), now restricted to western and especially northwestern portion of state, where it is still common; breeding in Sioux and Dawes counties, in winter east to Long Pine and Badger in the Niobrara valley.

477. *\*Cyanocitta cristata* (Linnaeus)—BLUE JAY.

Entire state, resident, abundant eastward, uncommon westward. Though present in winter, the majority retire farther south at that

season, returning about middle April, breeding in May, and leaving again in late October. Spreading westward rapidly.

478c. *Cyanocitta stelleri annectens* (Baird)—BLACK-HEADED JAY.

One record for the state, a bird seen in Sioux county on the timber reserve west of Fort Robinson in April, 1891, by Bruner. This bird is common in eastern Wyoming. The Long-crested Jay, 478b. *C. s. diademata* (Bonaparte), is the Colorado form, occurring also in southern Wyoming and might occur in winter in southwestern Nebraska.

- [480. *Apelocoma woodhousii* (Baird)—WOODHOUSE JAY. This was recorded in Bruner's list as a common "transient visitor" at North Platte by M. K. Barnum, but it was confused with the Piñon Jay. The Woodhouse Jay, however, is a common resident in Colorado, and has been taken from October to April at Fort Lyon, so may occasionally reach the state.]

484. *Perisoreus canadensis* (Linnaeus)—CANADA JAY.

Very rare winter visitor. The only record is the one by Bruner, who saw a specimen of this bird at West Point either the last few days in February or in early March, 1886. There is no question as to identification as the bird was approached to within a few feet.

484a. *Perisoreus canadensis capitalis* Ridgway—ROCKY MOUNTAIN JAY.

Probably a regular winter visitant to northwest Nebraska. Bruner has noted it three times—near Belmont in the spring of 1889, at the timber reservation west of Ft. Robinson in April, 1891, and at the head of Monroe canyon in February, 1896.

486. *Corvus corax sinuatus* (Wagler)—AMERICAN RAVEN.

Formerly frequent, now very rare if not extinct in the state. Aughey says it "was formerly frequently seen in Nebraska, especially in its northern part; latterly (1877) seldom met with." He examined a single one in June, 1865. Bruner has noted it in Brown county and near Sidney. L. Skow reports it from Omaha. Whether any of these records pertain to the eastern form (468a. *C. c. principalis* Ridgway) can not now be determined beyond doubt, but it is not probable that they do.

487. *Corvus cryptoleucus* Couch—WHITE-NECKED RAVEN.

Aughey states that he saw this raven but once in Nebraska, on the Republican river near the west line of the state in April, 1877. Bruner noted it once near Sidney. Now probably extinct within our borders.

488. \**Corvus americanus* Audubon—CROW.

Resident over the whole state, abundant eastward, becoming rare westward, but steadily spreading in that direction. Rare west of 98th meridian, but reaching regularly up the Niobrara to Long Pine; only once seen at Crawford till Aug., 1903, when Bruner observed

a flock of about a dozen twelve miles west, at Glen. Breeds from early April to late in June.

491. *Nucifraga columbiana* (Wilson)—CLARKE NUTCRACKER.

Northwestern Nebraska; occasionally seen in summer on Pine ridge where it may breed. In fall and winter spreading south and east to Sidney, Kearney, North Platte, and even to Omaha.

492. \**Cyanocephalus cyanocephalus* (Wied)—PINION JAY.

Common resident, spending the summer and occasionally breeding along Pine Ridge in Sioux, Dawes, and Sheridan counties; in winter wandering in flocks eastward to Cherry county, Long Pine, North Platte, Fullerton, etc.

FAMILY ICTERIDÆ—BLACKBIRDS, ORIOLES, AND MEADOWLARKS

1. Body deep black with conspicuously contrasting, sharply defined, unbroken patches of bright yellow, scarlet, white, or chestnut somewhere, and without streaks. . . . . (2)
1. Body entirely deep black, brownish, or slaty grayish, unstreaked and without an unbroken patch of bright color anywhere, though sometimes varied with broken rusty or yellowish which is never sharply defined. . . . . (7)
1. Body above brownish or dusky streaked, below lighter with conspicuous streaks on the sides. . . . . (11)
1. Body olivaceous above and dull yellow or orange below, unstreaked. . . . . (15)
  2. Belly deep black; marsh birds (3)—uniform chestnut or orange; arboreal birds. . . . . (5)
3. Black; rump, and shoulders white, back neck buffy white; tail feathers acute at tip. . . . . Bobolink, male.
3. Black; head, and breast yellow except some black around bill; a white wing-patch. . . . . Yellow-headed Blackbird, male.
3. Black; shoulders scarlet bordered by buffy. . . . . (4)
  4. Smaller, with a longer, slenderer bill; wing about  $4\frac{1}{2}$ , depth of bill at base about  $\frac{1}{2}$  inch; middle wing-coverts paler buff in winter. . . . . Red-winged Blackbird, male.
  4. Larger, with a shorter, thicker bill; wing about 5 inches, depth of bill at base decidedly over  $\frac{1}{2}$  inch; middle wing-coverts deeper buff in winter. . . . . Northern Redwing, male.
5. Black; with breast, belly, lower back, and rump chestnut. . . . . Orchard Oriole, male.
5. Black; with breast, belly, lower back, and rump with most of tail orange. . . . . (6)
  6. Head entirely black, outer tail feathers orange with some black at base and greater wing-coverts black broadly edged with white. . . . . Baltimore Oriole, male.
  6. Head black with cheeks and line over eyes yellow, outer tail feathers with the black near the tip, and a large wholly white patch on greater wing-coverts. . . . . Bullock Oriole, male.
7. Tail rounded, the outer feathers about an inch shorter than inner

- ones; male black with head metallic bluish purple, back metallic bronze, wings and tail metallic purplish black; female similar but duller, and less metallic; iris white. . . . . **Bronzed Grackle.**
7. Tail square, the outer feathers almost or quite as long as inner ones. . . (8)
8. Brownish above and below with a yellowish throat and breast. . . . . **Yellow-headed Blackbird, female.**
8. Black, brownish or slaty, without any yellowish anywhere. . . (9)
9. Bill short and thick, its depth over half its length, plumage never rusty; male entirely glossy blue-black with brown head and neck; female entirely brownish gray. . . . . **Cowbird.**
9. Bill long and slender, its depth about half its length or less, plumage often with rusty. . . . . (10)
10. Male black with a faint green gloss, and a faint blue gloss on head, in winter upper parts conspicuously varied with rusty; female entirely dull slate, varied with rusty in winter. . . . . **Rusty Blackbird.**
10. Male black with a deep green gloss, head and neck with a beautiful violet iridescence, in winter faintly varied with grayish brown; female brownish gray without any rusty even in winter. . . . . **Brewer Blackbird.**
11. Under parts mostly bright yellow, with a conspicuous black crescent on throat. . . . . (12)
11. Under parts pale yellowish or buffy without a black throat crescent. . . (13)
12. Yellow of throat confined to space between the maxillæ; upper parts dark brown with conspicuous black stripes; middle tail feathers with more or less confluent black bars not reaching to edge of feather. . . . . **Meadowlark.**
12. Yellow of throat spreading on cheeks; upper parts pale gray, more barred than striped; middle tail feathers with broken bars crossing entire feather. . . . . **Western Meadowlark.**
13. Back buffy olive, streaked with black, whole under parts yellowish or buffy; tail feathers stiff and pointed. . . . . **Bobolink, female.**
13. Back dusky, streaked with rusty and buffy, under parts dull white streaked with black, sometimes a buffy or pinkish tinge on throat; tail feathers blunt and soft. . . . . (14)
14. Smaller, with a longer, slenderer bill, wing under 4 inches, depth of bill at base about  $\frac{3}{8}$  inch; chin and throat seldom pinkish, and then less deeply or extensively so. . . . . **Red-winged Blackbird, female.**
14. Larger, with a shorter, thicker bill; wing over 4 inches, depth of bill at base decidedly over  $\frac{3}{8}$  inch; chin and throat generally pinkish, this color deeper and more extensive. . . . . **Northern Redwing, female.**
15. Tail and its upper coverts olive greenish tinged slightly with yellowish; female with throat dull yellow, young male with throat black. . . . . **Orchard Oriole, female and immature male.**
15. Tail and its upper coverts dull yellow. . . . . (16)

16. Crown olive-gray without blackish spots, or sides of head dull orange with a stripe over the eye of the same color; upper parts paler and grayer. **Bullock Oriole**, female and immature male.
16. Crown streaked or spotted with black, sometimes wholly black, or sides of head dusky and no stripe over eye; upper parts darker, more olivaceous. . . . . **Baltimore Oriole**, female and immature male.

494. \***Dolichonyx oryzivorus** (Linnaeus)—**BOBOLINK**.

Present and breeding in suitable localities over the state, locally abundant, especially in the sand-hill lake region. Arrives first week in May, breeds from late May to middle June, departs in middle September. Cherry and Holt counties, North Platte—abundant breeder. Omaha, Lincoln, Beatrice, Gresham, Scribner, Norfolk, York, Neligh—occasional breeder.

495. \***Molothrus ater** (Boddart)—**COWBIRD**.

Entire state, abundant; arriving about the third week in March or a little earlier, breeding (parasitically) throughout the season, remaining commonly until late October or early November.

497. \***Xanthocephalus xanthocephalus** (Bonaparte) —**YELLOW-HEADED BLACKBIRD**.

Whole of the state, abundant migrant and (locally) summer resident and breeder, especially in the lakes of the sand-hill region. Omaha, Lincoln, Peru, West Point, Neligh, York, and west to Dundey county—occasional to common breeder. Arrives second week in April, breeds in May, departs in late October.

498. \***Agelaius phoeniceus** (Linnaeus)—**RED-WINGED BLACKBIRD**.

A common to abundant summer resident and breeder over entire state in the vicinity of marshy ground. Arrives first or second week in March, breeds from middle May to middle July, departs in early November, a few remaining all winter.

498d. **Agelaius phoeniceus fortis** Ridgway—**NORTHERN REDWING**.

Common migrant. The type of this new form was taken at Omaha, March 9, from migrating individuals, the breeding range being the far northern "interior districts of British America." In migrations it extends over the whole region from the Rockies to the Mississippi.

501. **Sturnella magna** (Linnaeus)—**MEADOWLARK**.

Although nearly all our meadowlarks belong to the following species, there is yet an occasional occurrence of typical *magna* or specimens nearer *magna* than *neglecta* in extreme eastern Nebraska. Such specimens have been noted several times at Omaha, and on March 18, 1903, a bird evidently *magna* by both appearance and song was carefully observed by both Wolcott and Swenk near the lake west of Lincoln. It is, however, rare, and its breeding doubtful.

501b. *\*Sturnella magna neglecta* (Audubon)—WESTERN MEADOWLARK.

Abundant throughout the state, arriving the first week in March, breeding from the latter part of April to the middle of July, the majority departing south of the state late in October, but a considerable number remaining in flocks through the winter. The meadowlarks from the lake region of Cherry county, differ from both the two forms here referred to in certain ways, but the sending of specimens east has so far failed to satisfactorily settle their relationship.

506. *\*Icterus spurius* (Linnaeus)—ORCHARD ORIOLE.

Eastern Nebraska, common summer resident and breeder west to 100th meridian or a little farther. Arrives first of May, breeds in June, leaves second week in September. Omaha, Peru, Lincoln, West Point, Neligh, Niobrara valley, Cherry county, North Platte.

507. *\*Icterus galbula* (Linnaeus)—BALTIMORE ORIOLE.

Eastern Nebraska, west about as far as preceding, apparently commoner than *spurius*, its dates practically the same. Omaha, Lincoln, West Point, Neligh, Niobrara valley to Valentine, North Platte.

508. *\*Icterus bullocki* (Swainson)—BULLOCK ORIOLE.

Western Nebraska, east to about western limit of *galbula* which it replaces westward. It is a common breeder in Sioux, Dawes, and Scott's Bluff counties, nesting mostly in cottonwoods. Also Dundy county to McCook and Cherry county to Long Pine, Carns—breeding. Once taken migrating at West Point.

509. *Scolecophagus carolinus* (Mueller)—RUSTY BLACKBIRD.

Common migrant and occasional winter resident over about the eastern half of the state, appearing in early October and remaining well into April. Omaha, Lincoln, Beatrice, West Point, Neligh, Long Pine, Cherry County, etc.

510. *\*Scolecophagus cyanocephalus* (Wagler)—BREWER BLACKBIRD.

Common summer resident and breeder in Sioux county, in migrations over entire state. Cherry and Holt counties, Neligh, West Point, York, Lincoln, Omaha—migratory, passing in October and latter part of March and in April.

511b. *\*Quiscalus quiscula æneus* (Ridgway)—BRONZED GRACKLE.

Abundant summer resident and breeder over entire state, not so common westward; arriving the third week in March, breeding during May, departing in large flocks in late October and early November. A very few winter along the southern border of state. To this form belong all Nebraska records of the "Purple" Grackle, the eastern form, which is accidental west of the Alleghanies.

FAMILY FRINGILLIDÆ—FINCHES, SPARROWS, AND GROSBEAKS

1. Bill very large, almost as deep at base as tarsus is long; male yellow and black, female grayish and black; winter visitor. . . . . (2)
1. Bill much shallower, its depth at base decidedly less than length of



- tarsus; nostrils more or less concealed by one or two tufts of forwardly directed plumules; winter birds. . . . . (3)
1. Bill also shallower, but nostrils exposed, or at least without distinct tufts of plumules; mostly summer birds. . . . . (23)
2. Bill shorter and stouter, the culmen generally under  $\frac{1}{2}$  inch; male with yellow stripe on forehead broader, generally over  $\frac{1}{2}$  inch; female grayer below. . . . . **Evening Grosbeak.**
2. Bill longer and narrower; culmen generally over  $\frac{1}{2}$  inch; male with the forehead stripe generally under  $\frac{1}{2}$  inch, female more buffy below. . . . . **Western Evening Grosbeak.**
3. Tips of bill distinctly crossed (4)—not crossed. . . . . (6)
4. Wings black with two distinct white bars. . . . . **White-winged Crossbill.**
4. Wings dusky, not barred. . . . . (5)
5. Smaller, wing of male about  $3\frac{1}{2}$  inches and culmen under  $\frac{3}{4}$  inch, colors duller. . . . . **Red Crossbill.**
5. Larger, wing of male about  $3\frac{1}{2}$  inches and culmen over  $\frac{3}{4}$  inch; colors brighter. . . . . **Mexican Crossbill.**
6. Bill very short and thick, the culmen much curved; size very large, the tail over  $3\frac{1}{2}$  inches long. . . . . (7)
6. Bill conical, the culmen but slightly curved; size smaller, the tail less than  $3\frac{1}{2}$  inches long. . . . . (8)
7. Bill shorter and thicker; the culmen in male about  $\frac{3}{4}$  inch, and dusky centers to back feathers more pronounced, the breast and sides more uniformly and extensively red. . . . . **Pine Grosbeak.**
7. Bill longer and narrower; culmen in male somewhat over  $\frac{3}{4}$  inch, the dusky centers to back feathers nearly obsolete, the under parts less extensively red, more or less broken even on the breast. . . . . **Mountain Pine Grosbeak.**
8. Crown from eye backward pure ash gray; general color chestnut and rosy. . . . . (9)
8. Crown not ash gray. . . . . (10)
9. Gray of crown not spreading on sides of head below eyes. . . . . **Gray-crowned Leucosticte.**
9. Gray of crown spreading over more or less of sides of head below eyes. . . . . **Hepburn Leucosticte.**
10. Top of head some shade of red, either wholly or in part (11)—without any red. . . . . (16)
11. Chin blackish (12)—not blackish. . . . . (14)
12. Under tail-coverts and rump unstreaked; back feathers bordered with hoary. . . . . **Hoary Redpoll.**
12. Under tail-coverts and rump streaked; back feathers bordered with brownish. . . . . (13)
13. Larger (wing about  $3\frac{1}{2}$  long) with heavier bill (depth at base over  $\frac{1}{2}$  inch); back darker and sides more heavily streaked. **Greater Redpoll.**
13. Smaller (wing  $2\frac{3}{4}$  to 3 long) with slenderer bill (under  $\frac{1}{2}$  inch); back paler, sides less streaked. . . . . **Redpoll.**
14. Whole crown red; wing feathers edged with reddish. . . . . (15)

14. Only forehead and superciliary stripe red; wing feathers edged with grayish. . . . . **House Finch**, male.
15. Crimson of crown deeper than rest of body; under tail-coverts streaked. . . . . **Cassin Purple Finch**, male.
15. Purple of crown same shade as rest of body; under tail-coverts unstreaked. . . . . **Purple Finch**, male.
16. Back not streaked (17)—back streaked. . . . . (19)
17. Back yellow or brown; male yellow with black crown and wings, female brownish above, white below. . . . . (18)
17. Back olive-green; yellow below, with a white wing spot; male with crown black. . . . . **Arkansas Goldfinch**.
18. Larger (wing 3 inches, tail 2); paler, more extended white markings. . . . . **Western Goldfinch**.
18. Smaller (less than above); darker, more restricted white markings. . . . . **Goldfinch**.
19. Not streaked below; white marked with brown and black. **Snow Bunting**.
19. Streaked below. . . . . (20)
  20. Yellow bars on wings and tail; very streaky; wing under 3 inches. . . . . **Pine Siskin**.
  20. No yellow bars; wing over 3 inches. . . . . (21)
21. Tail not notched—**House Finch**, female—tail deeply notched. . . . . (22)
  22. Under tail-coverts streaked. . . . . **Cassin Purple Finch**, female.
  22. Under tail-coverts unstreaked. . . . . **Purple Finch**, female.
23. Head conspicuously crested; male red, female gray and red. . . **Cardinal**.
23. Head not crested. . . . . (24)
  24. Front claws small, little curved; hind claw straight, longer than toe. . . . . (25)
  24. Front claws larger, curved; hind claw curved, either shorter than toe or very stout. . . . . (29)
25. Tail white except two middle feathers and a broad dusky tip; bill stout. . . . . **McCown Longspur**.
25. Tail with outer feathers mostly white without dark tip, inner ones mostly dark; bill rather slenderer. . . . . (26)
  26. Four outer tail feathers with much white at base. . . . . **Chestnut-collared Longspur**.
  26. Outer tail feathers dusky at base, only two with white. . . . . (27)
27. Under parts buffy; second outer tail feather mostly white. . . . . **Painted Longspur**.
27. Under parts white; second outer tail feather with little white. . . . . (28)
  28. Darker and browner; back more heavily streaked, with the dark centers of feathers broader than the light brown edgings. . . . . **Lapland Longspur**.
  28. Lighter and more buffy; back less heavily streaked, with dark centers of feathers narrower than the pale grayish buffy edgings. . . . . **Alaskan Longspur**.
29. Upper parts not dark streaked; sometimes with white ones. . . . . (30)

29. Upper parts decidedly, generally conspicuously, darker streaked, never with white ones. . . . . (52)
30. Outer tail feathers with a conspicuous amount of white (31)—  
without white. . . . . (42)
31. Plain dark and white, without any bright red, brown or yellow; tail under 3 inches. . . . . (32)
31. Some bright red, brown or yellow in plumage; tail over 3 inches. . . . (39)
32. Three outer tail feathers white; generally two white wing-bands. . . . . **White-winged Junco.**
32. Third outer tail feather mostly dark; no wing-bands. . . . . (33)
33. Sides gray like chest, with no pinkish tinge. . . . . (34)
33. Sides pinkish, cinnamon or buffy. . . . . (35)
34. Back with a triangular cinnamon rufous patch; head ashy. . . . . **Gray-headed Junco.**
34. Back plain slate or slightly brownish tinged; head slate. . . . . **Slate-colored Junco.**
35. Head, neck and upper chest sooty black; a squarish brownish back patch. . . . . **Shufeldt Junco, male.**
35. Head, neck, and chest gray or slaty. . . . . (36)
36. Second outer tail feather nearly or entirely white; throat and chest ashy. . . . . **Pink-sided Junco.**
36. Second outer tail feather with much dark; throat and chest slaty. . . . . (37)
37. Wing 3 inches or less long (38)—wing 3 to  $3\frac{1}{4}$  long. **Montana Junco, male.**
38. Throat and chest grayish slate. . . . . **Shufeldt Junco, female.**
38. Same parts ash-gray or slaty-gray. . . . . **Montana Junco, female.**
39. Plumage mostly black and white; under wing-coverts and breast rose. . . . . **Rose-breasted Grosbeak, male.**
39. Plumage mostly black and white; under wing-coverts yellow, breast tawny. . . . . **Black-headed Grosbeak, male.**
39. Under wing-coverts white; upper parts largely black, sides chestnut-brown. . . . . (40)
40. Head and back solid black without white streaks. . . . . **Towhee.**
40. Head and back black, the latter streaked with white and often with brownish edgings to feathers. . . . . (41)
41. Outer web of primaries with white edging often forming a patch; whole outer web of outer tail feather white, the white patch on inner web generally over  $1\frac{1}{4}$  inches long; hind claw moderate. . . . . **Arctic Towhee.**
41. Outer web or primaries without distinct white edging, never forming a patch; only outer edge of outer web of outer tail feather white, the white patch on inner web generally under  $1\frac{1}{4}$  inches long; hind claw large, stout. . . . . **Spurred Towhee.**
42. Olive green above, whitish below, crown reddish. . . . . **Green-tailed Towhee.**
42. Not olive green above, or if so, no reddish crown. . . . . (43)
43. Black, with a large white wing-spot. . . . . **Lark Bunting, male.**

43. Not pure black and white.....(44)
44. Throat distinctly streaked; above plain brown. **Canyon Towhee.**
44. Throat never streaked: male with much blue, female brownish above, light below.....(45)
45. Larger, with wing over 3 inches long; conspicuous chestnut wing-bands.....**Western Blue Grosbeak.**
45. Smaller, wing under 3 inches; no chestnut wing-bands.....(46)
46. Wing with two white wing-bars; male head and neck blue, belly white; female brown above, white below. **Lazuli Bunting.**
46. Wing without white bars.....(47)
47. Wholly bright blue—**Indigo Bunting**, male—under parts not blue..(48)
48. Throat red (49)—throat not red.....(50)
49. Under parts vermillion, back green, rump red. **Painted Bunting**, male.
49. Under parts purple, back red, rump blue.....**Varied Bunting**, male.
50. Under parts whitish (51)—under parts yellowish.....**Painted Bunting**, female.
51. Chest streaked—**Indigo Bunting**, female—chest not streaked.....**Varied Bunting**, female.
52. Outer pair of tail feathers decidedly shorter than the middle pair, making the tail plainly rounded.....(53)
52. Outer pair of tail feathers not decidedly shorter than middle pair, making the tail even or double rounded.....(70)
53. Outer tail feathers with a broad white tip (54)—without white.....(55)
54. Upper parts darker, with the streaks comparatively broad, the chestnut markings on head darker and more extensive black streaking through and below eye.....**Lark Sparrow.**
54. Upper parts paler, with much narrower and sharper streaks, the chestnut on head paler, and black more restricted.....**Western Lark Sparrow.**
55. Tail feathers very narrow, the tips pointed and stiff; marsh sparrows.....(56)
55. Tail feathers either broad or narrow, but tips bluntly rounded and not stiff.....(59)
56. Crown with an indistinct bluish median stripe; back without chestnut; feet dark.....**Nelson Sparrow.**
56. Crown with a distinct brownish or buffy median stripe; back marked with chestnut; feet pale.....(57)
57. Tail as long as wing; edge of wing white; nape bright rufous streaked with black; stripe over eye bright buffy.....**Leconte Sparrow.**
57. Tail shorter than wing; edge of wing pale yellow; nape pale olive green streaked with black; stripe over eye olive.....(58)
58. Darker above, with chestnut of back darker and more extensive; under parts more buffy.....**Henslow Sparrow.**
58. Paler above, with chestnut of back paler and more restricted; under parts whiter.....**Western Henslow Sparrow.**

59. Some distinct yellow on head and bend of wing (60)—no yellow anywhere ..... (63)  
 60. Bend of wing yellow, but none on head (61)—head with yellow ..... (62)
61. Back spotted and barred but not streaked with dusky; flanks broadly streaked with rusty; tail feathers lightly barred with dusky. .... **Cassin Sparrow.**
61. Back indistinctly streaked with rusty on a gray background, these streaks rarely with dusky centers; flanks not streaked and tail feathers with no indication of bars. .... **Bachman Sparrow.**
62. Front of median crown-stripe yellow; throat colored as chest ..... **Golden-crowned Sparrow.**
62. Upper lores yellow but none on median crown-stripe; a conspicuously contrasting, square, white throat-patch ..... **White-throated Sparrow.**
63. Crown either without median stripe, or the stripe very broad and pure white, bordered with black. .... (64)
63. Crown rufous with a lighter but not white, narrow median stripe. (66)  
 64. With a median stripe (65)—without a median stripe, often solid black. .... **Harris Sparrow.**
65. Upper half of lores black or brown, cutting the white superciliary stripe. .... **White-crowned Sparrow.**
65. Upper half of lores white or ashy, continuous with the superciliary stripe. .... **Intermediate Sparrow.**
66. Lower parts not distinctly streaked; crown and back largely chestnut ..... **Swamp Sparrow.**
66. Lower parts conspicuously streaked. .... (67)
67. Breast finely marked with narrow sharp streaks not tending to form a central spot and crossed by a broad cream buff band ..... **Lincoln Sparrow.**
67. Breast rather heavily marked, these streaks forming or tending to form a central spot, no buff band. .... (68)
68. Larger; tail generally over  $1\frac{1}{2}$  inches long, and bill slenderer, less than  $\frac{1}{2}$  inch deep at base. .... **Mountain Song Sparrow.**
68. Smaller; tail generally under  $1\frac{1}{2}$  inches, and bill about  $\frac{1}{2}$  inch deep at base. .... (69)
69. Upper parts paler, more gray, with very little or no rusty; superciliary stripe and sides of neck whitish; lower parts averaging less spotted. .... **Dakota Song Sparrow.**
69. Upper parts darker, with a conspicuous amount of rusty; superciliary stripe and sides of neck olive-grayish; lower parts averaging more spotted. .... **Song Sparrow.**
70. Lower parts not distinctly streaked (71)—distinctly streaked (84)
71. Edge of wing pure white (72)—yellow or yellowish. .... (81)  
 72. Upper tail-coverts covering half of tail; a white wing-bar; male with throat black ..... (73)  
 72. Upper tail-coverts covering less than half of tail. .... (74)

73. Crown grayish or olive—**English Sparrow**—chocolate brown.....  
 ..... **European Tree Sparrow**.
74. Crown grayish, streaked with black in adult..... (75)
74. Crown reddish, either wholly chestnut or speckled with  
 rusty in adult..... (76)
75. Crown with a distinct gray median stripe..... **Clay-colored Sparrow**.
75. Crown streaked uniformly throughout, no trace of a median stripe.  
 ..... **Brewer Sparrow**.
76. Breast with a dusky central spot; two wing-bands; lower  
 mandible yellow..... (77)
76. Breast without a spot..... (78)
77. Darker; the black streaks on back broader, with a considerable  
 amount of rusty, especially on scapulars; crown chestnut, me-  
 dian stripe but poorly defined; outer webs of tertials darker,  
 more chestnut; edgings to tail feathers narrower, grayish;  
 smaller, wing averaging under  $2\frac{3}{4}$  inches..... **Tree Sparrow**.
77. Paler; the black streaks on back narrower, with very little rusty;  
 crown cinnamon, median stripe generally well defined, gray-  
 ish; outer web of tertials paler, more buffy; edgings to tail  
 feathers broader, almost white, larger, wing averaging over  $2\frac{3}{4}$   
 inches..... **Western Tree Sparrow**.
78. A black line through eye; crown bright chestnut in adult  
 (young with crown brownish and breast streaked)..... (79)
78. No black line through eye; crown rusty..... (80)
79. Darker; ground color of back dark brown or rusty, crown darker  
 chestnut, rump and sides of head mouse gray, black stripe behind  
 eye broader; smaller, wing averaging under  $2\frac{1}{2}$  inches.....  
 ..... **Chipping Sparrow**.
79. Paler; ground color of back pale brown without rusty, crown paler  
 chestnut, rump and sides of head paler gray, black stripe behind  
 eye narrower; larger, wing averaging over  $2\frac{1}{2}$  inches.....  
 ..... **Western Chipping Sparrow**.
80. Upper parts more rusty, the crown bright rusty, rarely with  
 an indication of a median stripe; back with much rusty  
 and broader black streaks, under parts, especially the  
 breast, more buffy; decidedly smaller, wing  $2\frac{1}{4}$  to  $2\frac{3}{4}$  inches,  
 tail  $2\frac{1}{4}$  to  $2\frac{3}{4}$  inches in length..... **Field Sparrow**.
80. Upper parts grayer, the crown dull rusty, with a broad gray  
 median stripe, sometimes almost entirely gray; back mostly  
 grayish, with narrower black streaks; under parts paler, the  
 breast tinged with gray; decidedly larger, wing  $2\frac{3}{4}$  to  $2\frac{1}{2}$   
 inches, tail  $2\frac{3}{4}$  to  $2\frac{1}{2}$  inches in length..... **Western Field Sparrow**.
81. Outer tail feather with some conspicuous white; a blackish dot on  
 breast..... **Sage Sparrow**.
81. Outer tail feather without white..... (82)
82. Breast bright yellow; throat, except white chin, black. **Dickcissel**.
82. Breast without yellow; throat without black..... (83)

83. Darker; with broad black centers to the feathers, the hind neck distinctly streaked, the throat and cheeks buffy; smaller, wing averaging under  $2\frac{3}{8}$  inches. . . . . **Grasshopper Sparrow.**
83. Paler; with brown predominating on upper parts rather than black, the hind neck scarcely streaked, merely speckled, the throat and cheeks whitish; larger, wing averaging over  $2\frac{3}{8}$  inches . . . . . **Western Grasshopper Sparrow.**
84. Outer tail feathers mostly white, bend of wing chestnut. . . . . (85)
84. Outer tail feather with little or no white, and bend of wing not chestnut. . . . . (86)
85. Darker, with broader and blacker streaking; smaller, wing averaging under  $3\frac{1}{8}$ , tail under  $2\frac{1}{2}$  inches long. . . . . **Vesper Sparrow.**
85. Paler and grayer, the streaking much sharper and narrower, less intensely black; larger, wing averaging over  $3\frac{1}{8}$ , tail over  $2\frac{1}{2}$  inches long. . . . . **Western Vesper Sparrow.**
86. Under wing-coverts lemon yellow. **Black-headed Grosbeak, female.**
86. Under wing-coverts orange yellow. . . . . **Rose-breasted Grosbeak, female.**
87. Wings and tail with much rusty red (88)—without rusty red. . . . . (89)
88. Color of back gray, well streaked with chestnut, with rusty red upper tail-coverts and tail. . . . . **Fox Sparrow.**
88. Color of back and rump plain unstreaked gray in strong contrast with rusty red upper tail-coverts and tail. . . . . **Slate-colored Sparrow.**
89. Bend of wing with large white patch—**Lark Bunting, female**—without white patch. . . . . (90)
90. Hind claw longer than its digit; tertials shorter than primaries; head suffused with yellow, two black stripes on crown and conspicuous maxillary and rictal stripes. . . . . **Baird Sparrow.**
90. Hind claw about as long as digit; tertials about as long as primaries. . . . . (91)
91. Darker and browner; streaking broader, superciliary stripe yellow; smaller, wing averaging under  $2\frac{3}{8}$  inches, bill stouter, over  $\frac{1}{4}$  inch deep at base. . . . . **Savanna Sparrow.**
91. Paler and grayer; streaking narrower, superciliary stripe less yellow, often wholly white; larger, wing averaging over  $2\frac{3}{8}$  inches, bill more slender, under  $\frac{1}{4}$  inch deep at base. . . . . **Western Savanna Sparrow.**
514. **Hesperiphona vespertina** (Cooper)—**EVENING GROSBEEK.**

An irregular and rather rare fall and winter visitant over the state. Has been found from October to March. Recorded from West Point, Lincoln, Omaha, Cedar Bluffs, Long Pine, and Curtis—all based on specimens taken. It is quite probable that the western subspecies, *H. v. montana* Ridgway, may occasionally make its way in winter to the western part of our state, since it is resident in Colorado and

occurs in western Kansas, but as yet no specimens of this form have been examined.

515. *Pinicola enucleator leucura* (Mueller)—PINE GROSBEAK.

A rare and irregular winter visitant, occurring from November to late February or early March. Recorded from Lincoln, Omaha, Grand Island, Long Pine, Norfolk, and Neligh. As in the preceding species there is a western or mountain form, *P. e. montana* Ridgway, which may reach the western part of the state in winter, but has not yet been taken.

517. *Carpodacus purpureus* (Gmelin)—PURPLE FINCH.

An uncommon migrant and rare winter resident. Passes through in October, November, and in April. Omaha, Lincoln, West Point, Peru, and Neligh.

- [518. *Carpodacus cassini* Baird—CASSIN PURPLE FINCH. This bird has been recorded from Sioux county by J. B. White, but in absence of a specimen or further corroborative evidence it cannot be included in the check-list. However there is little doubt but that it does occur occasionally in extreme western Nebraska as well as a third member of the genus: 519. *Carpodacus mexicanus frontalis* (Say), the House Finch, which is common in eastern Colorado and southeastern Wyoming and has been taken in western Kansas in January.]

521. *Loxia curvirostra minor* (Brehm)—RED CROSSBILL.

An irregular, but during most years rather common, winter resident, appearing in flocks in late September or October and remaining about coniferous groves until late in April or even the end of May. Specimens from eastern Nebraska for the most part agree closely in measurements with *minor*, but those from Sioux county in winter are uniformly larger, agreeing better with Ridgway's unaccepted subspecies, *L. c. bendirei*, Bendire Crossbill, and probably representing wintering individuals of that form from the mountains. The common form, *minor*, is present throughout the summer in Sioux county feeding on pine seeds and sunflower seeds, but probably does not breed even there.

521a. *Loxia curvirostra stricklandi* Ridgway—MEXICAN CROSSBILL.

Most of the specimens of the intermediate *bendirei* agree more closely in measurements with this than with *minor*, and unless called *bendirei* must be referred to this. However, there is one specimen (a female, Neligh, Nebr., Dec. 9, 1898, Merritt Cary) which even under Ridgway's restriction must be placed here, its wing measuring 88 mm. and exposed culmen over 20 mm.

522. *Loxia leucoptera* Gmelin—WHITE-WINGED CROSSBILL.

A rare winter visitant. Records from West Point, Omaha, and Fairbury only. At the latter place Dr. M. L. Eaton took nine specimens.



524. *Leucosticte tephrocotis* Swainson—GRAY-CROWNED LEUCOSTICTE.

An uncommon winter resident in northwestern Nebraska, and once recorded from Omaha by L. Skow, who knew it in the northwestern part of the state. Aughey records a specimen taken in June, 1865. The specimens examined, all from Sioux county, are typical *tephrocotis*, but the Hepburn *Leucosticte*, 524a. *L. t. littoralis* (Baird), occupies much the same range in winter, and has been taken casually as far east as Minnesota, so may be reasonably expected within our limits.

528. *Acanthis linaria* (Linnaeus)—REDPOLL.

An irregular winter resident, in some seasons very abundant, generally coming in large flocks anywhere between middle of October and April. Throughout the state.

[528b. *A. l. rostrata* (Coues)—GREATER REDPOLL. A resident in Greenland and in winter straggling southward and westward. It has been recorded from New York, Indiana, Illinois, Michigan, and even Colorado, so we may get it also. The record in Bruner's list, Trostler says was a misidentification for *linaria*. An examination of twenty specimens from this state shows all to be nearest *linaria*, though some are large enough for *holballii*, but probably should be considered intermediates between *linaria* and *rostrata*.]

529. *\*Astragalinus tristis* (Linnaeus)—GOLDFINCH.

An abundant resident over the southeastern portion of the state, breeding from middle July to early September, remaining in flocks through the winter.

529a. *Astragalinus tristis pallidus* Mearns—WESTERN GOLDFINCH.

Sioux county—a single specimen, May 16, 1901; also found along the Niobrara, summer of 1902, and probably the prevailing form in the northern and western portions of the state. No doubt breeds. Specimens identified by Oberholser.

533. *Spinus pinus* (Wilson)—PINE SISKIN.

A common, though somewhat irregular, winter resident; appearing in early October and remaining until into May. Present all summer in the pines of Sioux county where it may breed. Omaha, Lincoln, Beatrice, West Point, Neligh, Sioux county.

000. *\*Passer domesticus* (Linnaeus)—ENGLISH SPARROW.

Throughout the state—abundant.

534. *Passerina nivalis* (Linnaeus)—SNOW BUNTING.

Entire state, irregular winter resident, present from early in November to the middle of March. Omaha, Lincoln, West Point, Gresham, Norfolk, Sidney, Sioux county. Breeds far north.

536. *Calcarius lapponicus* (Linnaeus)—LAPLAND LONGSPUR.

Greater portion of the state eastward, abundant winter resident, present from middle of October to early April. Omaha, Lincoln,

Beatrice, West Point, Wood River, Neligh, Cherry county. Breeds far north.

536a. *Calcarius lapponicus alascensis* Ridgway—ALASKAN LONGSPUR.

Western Nebraska in winter, dates as preceding. In a walk from Wray, Colo. to Haigler, Neb., Nov. 16, 1901, Bruner and Wolcott found these birds lying dead by the railroad track in numbers, along with Desert Horned Larks. They had been killed by flying against the telegraph wires while circling in immense flocks.

537. *Calcarius pictus* (Swainson)—PAINTED LONGSPUR.

An uncommon migrant, passing in late April and October. Recorded only from West Point and Lincoln, at the latter place several times. Specimens were secured from a flock of 50 in a corn field near Lincoln, April 20, 1901, by Cary and Carriker. Breeds far north.

538. *\*Calcarius ornatus* (Townsend)—CHESTNUT-COLLARED LONGSPUR.

A common migrant and uncommon breeder; the latter only along the northern border of the state. Aughey states he has found young from June to August, while Will Colt has taken nests at Badger, Holt county. Carlos Bates found a half dozen nests between June 14 and 22, 1903, only three miles from the Nebraska line in South Dakota north of Merriman, Neb. As a migrant it occurs from middle March to late April and from early to middle October over almost the whole state. Omaha, Lincoln, Norfolk, West Point, Neligh, O'Neill, Grand Island, Albion, Cherry county—common.

539. *\*Rhynchopanes mccownii* (Lawrence)—MCCOWN LONGSPUR.

An uncommon migrant over the state, breeding in Sioux county (See Proc. N. O. U. III, p. 74 and 84). Migrates from middle March to middle April and from late August to middle November. Breeds in June. Cherry, Harlan, and Franklin counties, Wood River, Neligh, West Point, Lincoln, Omaha.

540. *\*Poocetes gramineus* (Gmelin)—VESPER SPARROW.

Eastern edge of state, not west of 98th meridian, very common migrant and rare breeder; arriving second week in April, breeding in late May or early June, departing in October. Omaha, Peru, Lincoln, West Point, Gresham.

540a. *\*Poocetes gramineus confinis* Baird—WESTERN VESPER SPARROW.

Greater part of state, abundant westwardly, breeding commonly in Sioux and Cherry counties, less numerous east to Holt county, Neligh, Harlan county, etc. Dates as preceding.

542a. *Passerculus sandwichensis savanna* (Wilson)—SAVANNA SPARROW.

Eastern Nebraska, not recorded west of 99th meridian; a rather abundant migrant especially eastwardly, arriving in late March or early April, passing northward to breed, returning in October. Omaha, Peru, Lincoln, West Point, Neligh, O'Neill, Wood River, etc. Occasionally seen in summer, and may breed.

542b. *Passerculus sandwichensis alaudinus* (Bonaparte)—WESTERN SAVANNA SPARROW.

Entire state, occurring only as a migrant in eastern Nebraska; may rarely breed westwardly, though not known to do so. Cherry county, Neligh, Lincoln, Omaha—migrating; much the same dates as *savanna*. In a series of sixteen specimens from Lincoln taken during migrations only three can be referred to *alaudinus*, and only one of these is typical.

545. *Coturniculus bairdii* (Audubon)—BAIRD SPARROW.

An uncommon migrant, dates much as the Savanna Sparrow, commonest in fall. Breeds north of Nebraska. Lincoln, West Point, O'Neill—migrating.

546. *Coturniculus savannarum passerinus* (Wilson)—GRASSHOPPER SPARROW.

An occasional specimen is taken along the eastern edge of the state apparently nearer this than the following form, though even there *bimaculatus* predominates. Omaha, Peru, Lincoln. Breeding questionable.

546a. \**Coturniculus savannarum bimaculatus* (Swainson)—WESTERN GRASSHOPPER SPARROW.

An abundant migrant and very common summer resident over almost entire state, arriving first week in May, breeding from late May, through June, departing in early October. Sioux, Cherry and Holt counties, Neligh, West Point, Lincoln, Beatrice—breeding.

[547. *Ammodramus henslowii* (Audubon)—HENSLOW SPARROW.

Has been recorded from Nebraska, and is known to occur west to Minnesota. The only specimen available has been indentified by Oberholser as the Western. It is likely that all, or most, of the records refer to that form, but until more material is examined it cannot be safely assumed that they do. Its occurrence is probably analogous to that of the Grasshopper Sparrow.]

547a. \**Ammodramus henslowii occidentalis* Brewster—WESTERN HENSLOW SPARROW.

A rare migrant. Aughey "only occasionally met with this bird," and the only specimen he examined was taken at Kearney Junction in September, 1874. A specimen was taken at Lincoln, April 22, 1899, by Wolcott, and Bruner has seen it at West Point. It may occasionally breed locally in the state, since Trostler took a set of eggs, with female bird, at Omaha, belonging to this species and probably to this form.

548. *Ammodramus leconteii* (Audubon)—LECONTE SPARROW.

A very common migrant, arriving in late March and early April and lingering late into May, reappearing in late September and remaining commonly until November, occasionally even to the mid-

dle of that month. Breeds north of the state. Omaha, Lincoln, West Point, Neligh, Holt and Hall counties etc.; not recorded west of 99th meridian.

- [549.1. *A. nelsoni* (Allen), the Nelson Sparrow, although included in Bruner's list, has as yet no definite Nebraska record, though there is no doubt it will eventually be taken within the state, possibly breeding.]

552. *\*Chondestes grammacus* (Say)—LARK SPARROW.

Eastern edge of state; an abundant migrant and summer resident, arriving first week in April, breeding in late May and June, departing by the end of September. Omaha, Peru, Beatrice, Lincoln, West Point, etc.; not occurring west of 98th meridian.

552a. *\*Chondestes grammacus strigatus* (Swainson)—WESTERN LARK SPARROW.

Greater part of state, abundant, especially westwardly, intergrading with preceding in eastern portions of state. Sioux, Dundy, and Cherry counties, east to Niobrara City, Neligh, etc., or to about the 98th meridian—breeding. Dates as preceding.

553. *Zonotrichia querula* (Nuttall)—HARRIS SPARROW.

An abundant migrant and common winter resident in southern portions of state, lingering until middle or late May, reappearing in middle September, largest numbers present in April and October. Not recorded west of Cherry county. Omaha, Peru, Lincoln, Beatrice, West Point, Neligh, Genoa, Wood River, etc. Breeds north of Nebraska.

554. *Zonotrichia leucophrys* (Forster)—WHITE-CROWNED SPARROW.

A common migrant, arriving in middle April and lingering until well into May, reappearing in late September and remaining until November. Breeds north of Nebraska. Omaha, Lincoln, West Point, Neligh—apparently only eastern third of state.

554a. *Zonotrichia leucophrys gambelii* (Nuttall)—INTERMEDIATE SPARROW.

Migratory, not so common as preceding form, but occurring with it. Sioux and Cherry counties, Neligh, West Point, Lincoln, Crete, Omaha—migrant over entire state.

557. *Zonotrichia albicollis* (Gmelin)—WHITE-THROATED SPARROW.

Eastern Nebraska; a common migrant, arriving a little earlier and departing a little later than *leucophrys* and commoner than that species. Omaha, Peru, Lincoln, West Point, Neligh, etc.

559. *Spizella monticola* (Gmelin)—TREE SPARROW.

Eastern Nebraska; an abundant winter resident, appearing first week in October and remaining well into April. Most of the specimens from the eastern part of the state are intermediate between this and the following western race, but some are practically indistinguishable from Michigan and New York birds. Breeds far north. Omaha, Lincoln, Beatrice, West Point, etc.

559a. *Spizella monticola ochracea* Brewster—WESTERN TREE SPARROW.

Whole state in winter; abundant westward where it is apparently the only form, eastward less common, giving place to and intergrading with the preceding form. Dates as for *monticola*. Sioux and Cherry counties, Neligh, Lincoln, Omaha, etc.

560. *\*Spizella socialis* (Wilson)—CHIPPING SPARROW.

Eastern Nebraska; arriving the middle of April, breeding in June, departing in late September. Peru, Omaha, Dakota City, West Point, Neligh, Lincoln—common as a migrant and generally as a summer resident and breeder also. Between the 98th to beyond the 103d meridians (which is much over half the length of the state), there are few records for this bird until in Sioux county where it is abundant. This, together with the fact that the western form (560a. *S. s. arizonae* Coues) is the common one in Colorado and Wyoming even within a comparatively few miles of the Nebraska line (Cheyenne, Wyoming), makes it quite probable that the birds from that region are the western subspecies. Unfortunately, there are at present no specimens to decide the question.

561. *\*Spizella pallida* (Swainson)—CLAY-COLORED SPARROW.

An abundant migrant over entire state, and, according to Aughey, an occasional breeder in the northern part. Arrives first week in May and lingers through that month, appearing again in early September and remaining through October.

562. *\*Spizella breweri* Cassin—BREWER SPARROW.

Sioux county; a common summer resident and breeder locally. M. A. Carriker, Jr., found it breeding commonly along the north side of Indian creek in the summer of 1901. (See Proc. N. O. U. III, pp. 70 and 85.) J. M. Bates reports taking one specimen in Cherry county, May 16, 1891, which was sent to Washington for identification.

563. *\*Spizella pusilla* (Wilson)—FIELD SPARROW, and

563a. *\*Spizella pusilla arenacea* Chadbourne—WESTERN FIELD SPARROW.

The exact status of these two races in Nebraska is still somewhat uncertain, but during migrations *arenacea* occurs over almost the entire state. It breeds abundantly along its northern border (Valentine, Long Pine, Springview, Carns, Niobrara City) and less commonly southward (Broken Bow), being present as a migrant only at Neligh, West Point, and Lincoln. Arrives in late March and early April, breeds from middle May through July, departs in late September and early October. The birds breeding at Omaha, Peru, Rulo, Weeping Water, and other points in extreme eastern Nebraska, are certainly nearer *pusilla* than *arenacea*. There are not sufficient specimens at hand to definitely state the exact ranges of each form.

566. *\*Junco aikenii* Ridgway—WHITE-WINGED JUNCO.

A rather common summer resident in Warbonnet canyon, Sioux

county, where, during 1901, it was frequently observed by Cary and Carriker and a nest with four young birds found by the latter on June 29, thus establishing it as a breeder. Later Cary found another family of young birds two miles westward in the same canyon. In winter the birds breeding in the Black hills and northern Wyoming descend to the foothills and it becomes abundant in Sioux county. Bruner found it one of the most abundant birds in the region at Fort Robinson, Dec. 12-14, 1895, and later at Harrison, Feb. 18-29, 1896.

567. *Junco hyemalis* (Linnaeus)—SLATE-COLORED JUNCO.

An abundant winter resident over the state but more especially so eastward, arriving the second week in October and remaining until late in April. Both Aughey and Trostler record it as present in summer, but it probably does not breed south of northern Minnesota. Lincoln, Omaha, Rulo, Beatrice, West Point, Neligh, Long Pine, Sioux county, etc.

567b. *Junco hyemalis shufeldti* Coale—SHUFELDT JUNCO, and

567.1. *Junco montanus* Ridgway—MONTANA JUNCO.

Under these two names should probably be placed some of the records of the "Oregon Junco," for this state. Just which one is referred to in each case is now impossible to definitely state owing to the extreme similarity of the two species, but it is certain that both are represented. The former is a northwestern species breeding from Oregon to British Columbia and east to Montana, in winter migrating south over the Rocky mountain plateau of the United States to northern Mexico, and straggling eastward. The latter species breeds from Montana and Idaho north to Alberta, migrating south in winter to Mexico and straggling eastward. Specimens of one or the other of these species have been taken as far east as Illinois, Michigan, Indiana, Massachusetts, and Maryland. A single specimen of Shufeldt Junco was taken by J. M. Bates at Long Pine and identified by Ridgway.

[568. *J. mearnsi* Ridgway—THE PINK-SIDED JUNCO (= *annectens* Baird, in part) breeds in southern Idaho and Montana and winters south through Wyoming and Colorado to Mexico, and probably reaches western Nebraska during its migrations. The specimen (now unfortunately lost) recorded in Bruner's list as *annectens* was in all probability *montanus*.

[569. *J. caniceps* (Woodhouse), THE GRAY-HEADED JUNCO, breeds in the mountains of southern Wyoming and Colorado, descending in winter to the foothills and straggling eastward to Michigan, so may be expected in western Nebraska in winter. The record of *caniceps* from Sioux county published in Bruner's list was based on an immature specimen of *hyemalis*.]

581. *Melospiza melodia* (Wilson)—SONG SPARROW.

Arrives abundantly in late March or early April and lingers until

well into May, when it becomes rare until early September brings the fall migrants. It remains commonly all winter, and probably a few breed, especially in northern Nebraska. Entire state; resident—Omaha, Lincoln, West Point, Neligh, Long Pine, Sioux county.

581b. *Melospiza melodia juddi* (Bishop)—DAKOTA SONG SPARROW.

This form, described in April, 1896, and accepted by the A. O. U. committee the following November, though rejected by both Ridgway and Oberholser, seems to be fairly well entitled to recognition. A comparison of Nebraska and Michigan specimens shows many of our birds to be decidedly paler and grayer above, with a conspicuous suppression of the rufous so evident in *melodia*, and the superciliary stripe and sides of neck whitish rather than olive grayish, thus apparently representing the form named *juddi*. Specimens sent to Oberholser were returned labelled *melodia*, though according to the judgment of Bishop himself, to whom they were later sent, they are nearer *juddi*.

583. *Melospiza lincolni* (Audubon)—LINCOLN SPARROW.

An abundant migrant over the state, passing from second week in April to middle of May and from middle of September to late in October, very rarely wintering. Omaha, Lincoln, Peru, West Point, Neligh. Not known to breed in the state.

584. \**Melospiza georgiana* (Latham)—SWAMP SPARROW.

Eastern Nebraska, west to about the 100th meridian; common migrant, arriving late in April and lingering until middle May, reappearing in middle September and remaining through October, very rarely wintering. Omaha, Peru, Lincoln, West Point, Neligh—common migrant. Cherry county, Neligh—rare breeder, nesting in June.

585. *Passerella iliaca* (Merrem)—FOX SPARROW.

A common migrant in eastern Nebraska, passing in late March and early April and again through October to middle November, rarely wintering. Omaha, Peru, Lincoln, Beatrice, West Point, Neligh. Our birds are grayer than eastern individuals, showing a decided tendency toward the following form.

585c. *Passerella iliaca schistacea* (Baird)—SLATE-COLORED SPARROW.

Western Nebraska during migrations. According to Cooke (Birds of Colorado, p. 107), the type of this form came from Nebraska about twenty miles east of the Colorado line.

587. \**Pipilo erythrophthalmus* (Linnaeus)—TOWHEE.

Southeastern Nebraska; along southern border west to about 99th parallel, becoming more restricted to eastern portions northward, and replaced along northern border by the following species. Rulo, Peru, Omaha, Beatrice, Lincoln, West Point, Neligh—common breeder. Arrives in middle to late March or early April, breeds from late April to July, departs in late October or early November, a few remaining all winter.

588. \**Pipilo maculatus arcticus* (Swainson)—ARCTIC TOWHEE.

Northern and western Nebraska in summer, whole state during migrations. Sioux, Dawes, and Cherry counties, and east in Niobrara valley to its mouth, southward principally west of 100th parallel—abundant breeder. West Point, Lincoln, Beatrice, Omaha—abundant migrant. Arrives later than preceding species, about first week in April, and lingers through that month, in eastern parts of state, appearing again in larger numbers during October, rarely wintering. Some Sioux county specimens show a tendency toward the Spurred Towhee, 588a. *P. m. megalonyx* (Baird), in the slightly less extensive white on outer tail feathers.

- [592.1. *Oreospiza chlorura* (Audubon), the Green-tailed Towhee, was included in former lists on the authority of Baird, but the locality in which his specimens were taken is far without the present boundaries of the state. It is, however, a common bird from May to October in Colorado and eastern Wyoming, and is likely to occur in western Nebraska, during migrations at least.]

593. \**Cardinalis cardinalis* (Linnaeus)—CARDINAL.

Southeastern Nebraska. Rulo, Nebraska City, Omaha, Beatrice, Lincoln—common resident. West to Harlan county, north in winter rarely to West Point, Maple Creek, and Neligh.

595. \**Zamelodia ludoviciana* (Linnaeus)—ROSE-BREADED GROSBEEK.

Eastern third of state, or about west to 98th parallel; common to abundant summer resident and breeder. Omaha, Peru, Beatrice, Lincoln, West Point, Neligh. A straggler once at Long Pine. Arrives first week in May, breeds in early June, departs in middle September.

596. \**Zamelodia melanocephala* (Swainson)—BLACK-HEADED GROSBEEK.

Representing the preceding in western half of state during the breeding season. Sioux county east to Valentine, Long Pine and even Niobrara City, and Dundy county east to Holdrege, Kearney, Dannebrog, etc.—common to abundant breeder. During migrations over the state, rarely, to Neligh, York, Omaha. Dates as preceding.

597a. \**Guiraca caerulea lazula* (Lesson)—WESTERN BLUE GROSBEEK.

Over the entire state; locally common summer resident and breeder. Arrives first week in May, breeds in June, departs from middle to late September. Most common in Dundy, Thomas, and Cherry counties, and east in the Niobrara valley to Knox county; less common in Sioux county, at Broken Bow, Grand Island, Red Cloud, Beatrice, Omaha, and Lincoln.

598. \**Cyanospiza cyanea* (Linnaeus)—INDIGO BUNTING.

Eastern Nebraska; common summer resident and breeder west to the 98th meridian. Omaha, Peru, Beatrice, Lincoln, Columbus, West Point, Neligh—breeding. Straggling westward rarely in Niobrara valley to Eagle creek, Long Pine, and even Cherry county. Arrives first week in May, breeds early in June, departs early in September.



599. \**Cyanospiza amoena* (Say)—LAZULI BUNTING.

Sioux county; common summer resident and breeder. East during migrations to West Point and Lincoln. Dates as preceding.

604. \**Spiza americana* (Gmelin)—DICKCISSEL.

Entire state, locally common to abundant, especially eastward; arriving second week in May, breeding in June and July, departing late in August or early in September. Omaha, West Point, Lincoln, Neligh, and Brown, Cherry and Sioux counties—breeding.

605. \**Calamospiza melanocorys* Stejneger—LARK BUNTING.

Entire state; abundant westward, uncommon to rare eastward. Sioux to Cherry and Rock counties, Dundy to Harlan counties—abundant breeder. Neligh, Norfolk, Lincoln, Beatrice—occasional breeder, commoner during dry seasons. Dates as preceding species.

EXTRALIMITAL: Ten species belonging to this family are included in the above key which have no record for Nebraska, but which are possible within our boundaries, viz: 527a. *Acanthis hornemannii exilipes* (Coues), the Hoary Redpoll, an arctic bird which has occurred in northern Michigan and Illinois; 530. *Astragalinus psaltria* (Say), the Arkansas Goldfinch of the western United States, a species common throughout Colorado and recorded from Cheyenne, Wyoming, and which may eventually be recorded from Western Nebraska; 557. *Zonotrichia coronata* (Pallas), the Golden-crowned Sparrow of the extreme west, has strayed east in migrations to Nevada, Colorado, and even Wisconsin, to the latter state three times; 574a. *Amphispiza belli nevadensis* Ridgway, the Sage Sparrow, occurs in Colorado and Wyoming to within a short distance of Nebraska, and may occasionally stray to our sagebrush plains; 575a. *Peucea aestivalis bachmannii* (Audubon), the Bachman Sparrow, occurs north, locally, to the parallel of 40°, and has been taken in southeastern Iowa, so may reach us also; 578. *Peucea cassini* (Woodhouse) the Cassin Sparrow, of the arid Southwest, occurs north to western and central Kansas, so may be expected along our southern border westwardly; 581b. *Melospiza melodia montana* (Henshaw), the Mountain Song Sparrow, is the Colorado form even far out on the plains, so may reach us during migrations; 591. *Pipilo fuscus mesoleucus* (Baird), the Canyon Towhee of eastern Colorado and southwestward might reach our limits; 600. *Cyanospiza versicolor* (Bonaparte), the Varied Bunting of southern Texas and southward has strayed north to Michigan; 601. *Cyanospiza crissalis* (Linnaeus), the Painted Bunting, is a southern species occurring north to southern Kansas and Illinois.

## FAMILY TANAGRIDÆ—TANAGERS

1. General color red, or at least the head red. (Adult males).....(2)
1. General color olive-greenish above, yellow below. (Females and young males).....(3)
2. Wings and tail black; back, lower parts and head red. ....

.....Scarlet Tanager.

2. Wings and tail, along with back, lower parts and head red . . .  
     . . . . . **Summer Tanager.**
  2. Wings, tail and back black; under parts yellow, head red. . . .  
     . . . . . **Louisiana Tanager.**
  3. Wings with two yellow bands, or one yellow and one white; tail gray-  
     ish brown with yellowish olive-green edgings. . . . **Louisiana Tanager.**
  3. Wings without yellow bands . . . . . (4)  
     4. Under wing-coverts yellow, without dark outer margin. . . . .  
         . . . . . **Summer Tanager.**
  4. Under wing-coverts white, with olive, dusky, or black exterior  
     border. . . . . **Scarlet Tanager.**
607. **\*Piranga ludoviciana** (Wilson)—LOUISIANA TANAGER.  
 A common summer resident and breeder on Pine ridge in north-  
 west Nebraska.
608. **\*Piranga erythromelas** Vieillot—SCARLET TANAGER.  
 A common summer resident and breeder in eastern Nebraska.  
 Arrives first week in May, breeds in June, departs in early September.  
 Omaha, Lincoln, Beatrice, West Point, Weeping Water, Neligh.
- 610 **Piranga rubra** (Linnaeus)—SUMMER TANAGER.  
 A rare summer resident in extreme southeastern Nebraska. May  
 breed. Reported from Richardson county by Aughey and from  
 Douglas county by L. Skow and I. S. Trostler, the latter observing  
 a single specimen in July, 1894.

#### FAMILY HIRUNDINIDÆ—SWALLOWS

1. Wing over 5 inches long; male shining blue-black; the female duller  
     colored. . . . . **Purple Martin**
  1. Wing 5 inches or less in length. . . . . (2)  
     2. Tail 3 inches or more long, the notch more than an inch deep;  
         under tail feathers with white blotches; throat chestnut; back  
         lustrous steel-blue. . . . . **Barn Swallow.**
  2. Tail  $2\frac{1}{2}$  inches or less long . . . . . (3)
  3. Back with metallic luster or greenish. . . . . (4)
  3. Back brownish, without lustre. . . . . (5)  
     4. Above lustrous green, beneath white. . . . . **Tree Swallow.**
  4. Above opaque velvety green, beneath white. . **Violet-green Swallow.**
  4. Above steel-blue; throat chestnut or black; upper tail-coverts  
     redish. . . . . **Cliff Swallow.**
  5. Breast brownish; belly and throat white. . . . . **Bank Swallow.**
  5. Throat and breast brownish; belly white. . . . . **Rough-winged Swallow.**
611. **\*Progne subis** (Linnaeus)—PURPLE MARTIN.  
 Eastern half of state, common only eastwardly. Arriving about  
 first of April, breeding in the latter part of May and in June, depart-  
 ing in the middle of September. Omaha, Lincoln, West Point  
 Norfolk, Callaway, North Platte, Broken Bow, Neligh.

612. \**Petrochelidon lunifrons* (Say)—CLIFF SWALLOW.

Entire state; common summer resident and breeder, arriving by the middle of April, breeding in June, departing in early September. Omaha, Lincoln, West Point, Neligh, North Platte, and Cherry, Sioux and Dundy counties.

613. \**Hirundo erythrogastra* Boddaert—BARN SWALLOW.

Abundant over entire state, dates as preceding, but remaining into October.

614. \**Iridoprocne bicolor* (Vieillot)—TREE SWALLOW.

Entire state, breeding commonly along its northern border, rarely southward. Omaha, Lincoln, West Point, Neligh—mostly migratory, a rare breeder. Sioux county, Niobrara valley—a common breeder.

615. \**Tachycineta thalassina lepida* (Mearns)—VIOLET-GREEN SWALLOW.

Sioux county; common summer resident and breeder in cliffs. Once taken during migration at West Point by Bruner.

616. \**Riparia riparia* (Linnaeus)—BANK SWALLOW.

Entire state; arrives in middle April, breeds in May and June, and departs late in September.

617. \**Stelgidopteryx serripennis* (Audubon)—ROUGH-WINGED SWALLOW.

Eastern half or more of state—common summer resident and breeder in river banks, especially northwardly. Richardson county, Peru, Omaha, Lincoln, Beatrice, West Point, Neligh, Niobrara valley, Cherry county—breeding.

## FAMILY AMPELIDÆ—WAXWINGS

1. Wing-bar white; the under tail-coverts chestnut. . . . . Bohemian Waxwing.

1. Wing-bar wanting; under tail-coverts white. . . . . Cedar Waxwing.

618. *Ampelis garrulus* Linnaeus—BOHEMIAN WAXWING.

An irregular winter visitor, liable to occur from the middle of November till late in February or even March, over the entire state. Omaha, South Bend, Lincoln, Beatrice, West Point, Neligh, Cherry county, Curtis, Sioux county.

619. \**Ampelis cedrorum* (Vieillot)—CEDAR WAXWING.

Eastern Nebraska; very common as a migrant, not common in winter, and breeding but rarely in the state, most frequently northward. Omaha, Lincoln, Beatrice, West Point, Long Pine, Cherry county.

## FAMILY LANIIDÆ—SHRIKES

1. Breast with wavy cross-bars; no transverse black line on forehead. . . . .

. . . . . Northern Shrike.

1. Breast without conspicuous wavy cross-bars; a transverse black line on forehead. . . . . (2)

2. Rump and upper tail-coverts but little lighter than back. . . . .

. . . . . Loggerhead Shrike.

2. Rump and upper tail-coverts decidedly lighter colored than back.  
..... **White-rumped Shrike.**

621. **Lanius borealis** Vieillot—NORTHERN SHRIKE.

A common winter resident over entire state, appearing in middle October, and remaining late into March.—Rulo, Peru, Omaha, Lincoln, Beatrice, West Point, Neligh, and Cherry and Sioux counties.

622. \***Lanius ludovicianus** Linnaeus—LOGGERHEAD SHRIKE.

A large number of the smaller shrikes of eastern Nebraska agree precisely with the form described by Palmer as *migrans*, but until that form is recognized by the A. O. U. committee they must be referred here, since they are certainly not *excubitorides*. Breeding specimens of this form have been taken at Omaha, Lincoln, Beatrice, and West Point.

622a. \***Lanius ludovicianus excubitorides** (Swainson)—WHITE-RUMPED SHRIKE.

Entire state; eastward partially replaced by preceding form, but the commoner form even there. Arrives early in April, breeds late in April, in May, and in June, departs early in October. Omaha, Lincoln, Beatrice, West Point, Neligh, and Cherry and Sioux counties.

FAMILY VIREONIDÆ—VIREOS

1. Without distinct wing-bars. .... (2)
1. With distinct white or whitish wing-bars ..... (4)
  2. Under parts white ..... (3)
  2. Under parts yellowish; first primary over one inch long; crown gray with a white but no black bordering line over eye. .... **Philadelphia Vireo.**
3. Yellowish on sides; larger, first primary less than one inch long. .... **Warbling Vireo.**
3. Yellowish on sides; smaller, upper parts, particularly crown, grayer. .... **Western Warbling Vireo.**
3. Little or no yellowish on sides; first primary much over one inch long; crown slaty gray, bordered by a black and then a white band over the eye. .... **Red-eyed Vireo.**
4. First primary nearly as long as second; breast bright yellow; back bright olive-green; eye-ring yellow. .... **Yellow-throated Vireo.**
4. First primary shorter than second, less than one inch long, breast not yellow. .... (5)
5. Wing over  $2\frac{1}{4}$  inches long, eye-ring white. .... (6)
5. Wing under  $2\frac{1}{4}$  inches long, eye-ring variable. .... (7)
  6. Crown and sides of head bluish gray, changing to olive-green on the back; below white. .... **Blue-headed Vireo.**
  6. Crown and sides of head bluish gray, the back of same shade; below less pure white. .... **Plumbeous Vireo.**
7. Crown and sides of head black, changing to olive-green on the back; eye-ring white. .... **Black-capped Vireo.**
7. Crown and sides of head gray or olive ..... (8)

8. Crown olive, much like back; a distinct yellow line over eye. . . . . **White-eyed Vireo.**
8. Head grayish, much like back; eye-ring white. . . . . **Bell Vireo.**
624. **\*Vireo olivaceus (Linnaeus)—RED-EYED VIREO.**  
Entire state. Our commonest vireo except *bellii*; arriving first week in May, breeding from late in May to July, departing in the middle of September. Peru, Omaha, Lincoln, Beatrice, West Point, Neligh, and Cherry and Sioux counties—breeding throughout the state.
626. **Vireo philadelphicus (Cassin)—PHILADELPHIA VIREO.**  
Aughey claims to have found this bird common in eastern Nebraska, but recent observers have not noted it. Of *gilvus* he says "have only found this species abundant in northwestern Nebraska," and there is great probability that he confused the two species. Bruner's records were field identifications, and, with little doubt, refer to *gilvus* also. Skow has reported it from Omaha.
627. **\*Vireo gilvus (Vieillot)—WARBLING VIREO.**  
Eastern portion of the state, not so common as *olivaceus*, its dates the same as for that species. Peru, Omaha, Lincoln, Beatrice, West Point, Neligh, and Cherry county.
- 627a. **\*Vireo gilvus swainsoni Baird—WESTERN WARBLING VIREO.**  
A Sioux county specimen sent to Witmer Stone has served to confirm the identification of this sub-species. So far it has only been found in Sioux county, where it is common and breeds.
628. **\*Vireo flavifrons Vieillot—YELLOW-THROATED VIREO.**  
Eastern Nebraska; not recorded west of the 97th meridian, and quite rare north of the Platte. Arrives the first week in May, breeds early in June, departs late in August. Richardson county, Peru, Omaha, Nebraska City, Lincoln, Fairbury—rather a rare breeder, most common along the Missouri river bluffs.
629. **Vireo solitarius (Wilson)—BLUE-HEADED VIREO.**  
Eastern Nebraska in the heavier timber along Missouri and Elkhorn rivers; a rare summer resident, and possibly a breeder. Omaha, West Point.
- 629b. **\*Vireo solitarius plumbeus Coues—PLUMBEOUS VIREO.**  
Common summer resident and breeder in Sioux county.
630. **Vireo atricapillus Woodhouse—BLACK-CAPPED VIREO.**  
Probably accidental; a single bird clearly seen and thoroughly identified, June 19, 1894, near Bellevue, by I. S. Trostler and L. Skow.
631. **\*Vireo noveboracensis (Gmelin)—WHITE-EYED VIREO.**  
A not uncommon summer resident in eastern Nebraska along the Missouri river; not recorded west of 97th meridian. Arriving early in May, breeding in June, departing late in September. Aughey

found a nest of this bird in some shrubbery along the Nemaha in Richardson county in the spring of 1875. It is a rather common breeder at Omaha, and has also been noted at Lincoln and West Point.

633. \**Vireo bellii* Audubon—BELL VIREO.

Eastern half of state; abundant summer resident and breeder. Arrives first week in May; breeds late in May, in June, and in July; departs early in September. Peru, Omaha, Lincoln, Beatrice, Neligh—breeding. Long Pine, Valentine—a straggler.

FAMILY MNOTILTIDÆ—WOOD WARBLERS

1. Rictal bristles conspicuous, half as long as culmen or more; bill flattened, wider than high at base; flycatching habits. . . . . (43)
1. Rictal bristles wanting or inconspicuous, decidedly less than half as long as culmen; bill not flattened, as high or higher than wide at base. . (2)
  2. Bill narrowly wedge shaped, its tip sharp and not decurved; tail shorter than wing. . . . . (3)
  2. Bill slender but not wedge shaped, its tip decurved, tail shorter than wing. . . . . (11)
  2. Bill short, stout, higher than wide at base, culmen much decurved; tail longer than wing. . . . . (42)
3. Head buffy with four black stripes, above olive-greenish, below buffy . . . . . Worm-eating Warbler.
3. Whole head, neck, and under parts bright orange; back, wings, and tail ashy . . . . . Prothonotary Warbler.
3. Without four black head-stripes, and whole head not orange. . . . . (4)
  4. Wings with distinct white or yellow bars (5)—wings not barred. (7)
5. Throat black in male, gray in female; a large yellow wing-patch. . . . . Golden-winged Warbler.
5. Throat yellow; wings merely barred. . . . . (6)
  6. Whole under parts yellow; crown yellow; a black line through the eye. . . . . Blue-winged Warbler.
  6. Only throat and breast yellow; back bluish with a yellow spot . . . . . Northern Parula Warbler.
7. Rump greenish yellow, unlike grayish back; a yellow breast-patch. . . . . Virginia Warbler.
7. Rump about the same color as back. . . . . (8)
  8. Under tail-coverts and abdomen yellow. . . . . (9)
  8. Under tail-coverts and abdomen white. . . . . Tennessee Warbler.
9. Head gray with chin and throat yellow, and a white eye-ring . . . . . Nashville Warbler.
9. Head olive-greenish, lighter below, no eye-ring. . . . . (10)
  10. Duller, above grayish olive-green, below pale olive-yellowish . . . . . Orange-crowned Warbler.
  10. Brighter; above bright olive-green, below bright olive-yellow . . . . . Lutescent Warbler.

11. Inner web of outer tail feather with a distinct white spot (12)—without a white spot. . . . . (33)
  12. Plain black and white with a broad white median crown-stripe . . . . . **Black and White Warbler.**
  12. Not plain black and white, or if so, crown wholly black or dark (13)
13. Rump yellow (14)—not yellow . . . . . (17)
  14. White on tail in middle, extending equally over all but middle pair of feathers. . . . . **Magnolia Warbler.**
  14. White on tail near tip, or else occupying most of feathers. . . . . (15)
15. Crown black, cheeks chestnut; below yellow, streaked with black in adult. . . . . **Cape May Warbler.**
15. Crown and sides of breast more or less yellow; cheeks black or dark blue . . . . . (16)
  16. Throat white—**Myrtle Warbler**—yellow . . . . . **Audubon Warbler.**
17. Wing with a white patch at base of primaries; male, bluish above and white below, with cheeks, sides and throat black; female, olive above, yellowish below. . . . . **Black-throated Blue Warbler.**
17. Wing without such a white patch. . . . . (18)
  18. Throat and chest black or partly black (19)—without black (20)
19. Cheeks mostly blackish. . . . . **Townsend Warbler.**
19. Cheeks mostly yellow . . . . . **Black-throated Green Warbler.**
  20. Wings with two distinct bands, sometimes joined to form a patch . . . . . (21)
  20. Wings not banded or with but one band . . . . . (31)
21. Upper parts not grayish blue. . . . . (22)
21. Upper parts light grayish blue . . . . . **Cerulean Warbler, male.**
  22. A light line over eye (23)—no light line over eye . . . . . (26)
23. Throat white or yellowish white, no yellow on sides of head; above pale greenish blue. . . . . **Cerulean Warbler, female.**
23. Throat yellow, orange, or buff, or else sides of head mostly yellow. . . . . (24)
  24. Back plain slate-gray in adult, grayish brown in young; cheeks and forehead black. . . . . **Sycamore Warbler.**
  24. Back neither gray nor plain grayish brown. . . . . (25)
25. Back in male black and throat orange; in female streaked, throat yellowish. . . . . **Blackburnian Warbler.**
25. Back olive-green; throat wholly yellow. . . . . **Townsend Warbler, young—throat not wholly yellow. . . . . Black-throated Green Warbler, young.**
  26. Back more or less streaked (27)—plain olivaceous; below greenish yellow. . . . . **Pine Warbler.**
27. Sides of crown or space behind eye, black. . . . . (30)
27. Sides of crown not black. . . . . (28)
  28. Under tail-coverts white. . . . . (29)
  28. Under tail-coverts buff. . . . . **Bay-breasted Warbler, young.**
29. Sides of head, sides, and flanks unstreaked gray. . . . .
  - . . . . . **Chestnut-sided Warbler, young.**
29. Sides of head, sides, and flanks olive or streaked . . . . .
  - . . . . . **Black-poll Warbler, young.**

30. Crown olive-yellow; sides of head, throat and chest white, sides chestnut. . . . . **Chestnut-sided Warbler.**
30. Crown chestnut; sides of head black; throat, chest, and sides chestnut. . . . . **Bay-breasted Warbler.**
30. Crown black, no chestnut, but wholly black and white. . . . . **Black-poll Warbler.**
31. Back streaked with black; a white eye-ring; below pale yellow, sides streaked. . . . . **Kirtland Warbler.**
31. Back not streaked with black; no eye-ring. . . . . (32)
32. A distinct yellowish wing-band; crown unstreaked olive, below yellow. . . . . **Prairie Warbler.**
32. No wing-band; crown chestnut in adult, streaked grayish in young. . . . . **Palm Warbler.**
33. Above greenish yellow; below bright yellow, streaked with chestnut in male. . . . . **Yellow Warbler.**
33. If bright yellow below, not streaked, and sides of head with blackish (34)
34. Under parts distinctly spotted (35)—not spotted. . . . . (37)
35. Crown rufous, bordered by black; a white eye-ring but no dusky streak behind the eye. . . . . **Ovenbird.**
35. Crown plain olivaceous; no eye-ring, but with a dusky streak behind the eye. . . . . (36)
36. Line over eye narrow, yellowish; under tail-coverts yellowish; under parts, including throat, heavily streaked with blackish on a yellowish ground. . . . . **Grinnell Water-thrush.**
36. Line over eye broad, white; under tail-coverts buffy; under parts, excluding throat, lightly streaked with brownish on a buffy ground. . . . . **Louisiana Water-thrush.**
37. Throat and chest bright yellow; sides of head with black. . . . . (38)
37. Throat and chest bluish gray to blackish (male) or brownish to grayish (female). . . . . (40)
38. A yellow line over eye; whole crown black or grayish black. . . . . **Kentucky Warbler.**
38. No yellow line over eye; only forehead black. . . . . (39)
39. Space behind black on forehead of male pale gray; yellow of under parts duller; female darker above. Smaller, tail under 2 inches. . . . . **Northern Yellowthroat.**
39. Space behind black on forehead of male white; yellow of under parts much brighter, more orange; female paler above. Larger, tail over 2 inches. . . . . **Western Yellowthroat.**
40. Tail nearly even; breast without black, a decided white eye-ring. . . . . **Connecticut Warbler.**
40. Tail rounded; breast with black; no decided eye-ring, at most eyelids white. . . . . (41)
41. No white on eyelids; tail under 2 inches; chest blacker, lores less so in male. . . . . **Mourning Warbler.**
41. A white mark on each eyelid; tail over 2 inches, chest less black, lores more so. . . . . **Macgillivray Warbler.**



42. Brighter olive-green above, more greenish than gray; white on sides of throat more restricted, occupying less than half of malar area; yellow paler; tail under 3 inches long. . . **Yellow-breasted Chat.**
42. Grayer olive-green above, usually the gray predominating; white on sides of throat much more extended, occupying more than forward half of malar area; yellow deeper; tail over 3 inches long . . . . . **Long-tailed Chat.**
43. Base of tail, middle of wings, and sides orange (male) or dull yellow (female). . . . . **Redstart.**
43. No orange or dull yellow on wings or tail; belly bright yellow. . . . (44)
44. Outer tail feather largely white; head black, with forehead and cheeks yellow. . . . . **Hooded Warbler.**
44. Outer tail feather without white; throat yellow, not black (45)
45. Upper parts grayish; under tail-coverts white; a necklace of dusky spots across breast . . . . . **Canadian Warbler.**
45. Upper parts olive-green; under tail-coverts yellow; forehead yellow, male with black cap . . . . . (46)
46. Brighter; above more yellowish olive-green, below brighter yellow; wing over  $2\frac{1}{4}$  inches. . . . . **Pileolated Warbler.**
46. Duller olive-green above, duller yellow below; smaller, wing under  $2\frac{1}{4}$  inches. . . . . **Wilson Warbler.**

636. \**Mniotilta varia* (Linnaeus)—BLACK AND WHITE WARBLER.

A very common migrant over at least the eastern half of state, breeding in the wooded portions. Aughey records finding a nest near Lincoln in May, 1875, Swenk found it breeding commonly along the Niobrara from Long Pine canyon to its mouth, Wolcott and J. M. Bates report it summering in Cherry county, and L. Skow found it breeding at Omaha.

637. \**Protonotaria citrea* (Boddaert)—PROTHONOTARY WARBLER.

A fairly common summer resident and breeder in the heavily wooded Missouri bottoms, arriving late in April, breeding in June, and departing late in August and early in September. Aughey saw it a few times in Richardson county during June, 1875. It breeds every year around Omaha, though becoming each year less numerous, and M. A. Carriker, Jr., has found nests at Nebraska City. Has been seen once in migration at Lincoln and once at West Point.

639. *Helminthophila vermivorus* (Gmelin)—WORM-EATING WARBLER.

Aughey found this warbler in southeastern Nebraska in June, 1875, F. J. Brezee and I. S. Trostler have noted it in July and August at Omaha, and Wolcott has noted it several times in the vicinity of Lincoln, on the capitol grounds and in the deep woods near Roca, where it was present all summer in 1903. Breeding almost certain.

641. \**Helminthophila pinus* (Linnaeus)—BLUE-WINGED WARBLER.

A rather common summer resident and breeder in the wooded Missouri bottoms, arriving early in May and departing late in August.

Aughey observed it near the mouth of the Nemaha in June, 1875. It is present about Omaha and Peru all summer, and during 1900 nests were taken at the former locality by J. E. Wallace. Migrating individuals have been seen at Lincoln and Weeping Water.

642. *Helminthophila chrysoptera* (Linnaeus)—GOLDEN-WINGED WARBLER.

The only record of this eastern warbler is the one made by Aughey who stated he had occasionally seen it in eastern Nebraska. As it occurs regularly west to Minnesota it may yet prove not rare in the Missouri bottoms where its breeding is quite possible.

644. *Helminthophila virginiae* (Baird)—VIRGINIA WARBLER.

Again our only record is Aughey's, who saw a single specimen of this western warbler in a narrow belt of timber in the Republican bottoms in Hitchcock county. Of course it must be considered but a straggler in our state.

645. \**Helminthophila rubricapilla* (Wilson)—NASHVILLE WARBLER.

A common migrant and rare summer resident in the Missouri river region along the eastern edge of the state, where it breeds. Aughey found a young bird just from the nest June 10, 1865; and on June 11, 1900, at Nebraska City, M. A. Carriker, Jr., shot a female, with well-formed eggs in her ovary which showed evidence of having a nest in the vicinity; the latter, however, he was unable to find. This species remains all summer in the vicinity of Omaha, and has also been seen at Weeping Water and West Point.

646. *Helminthophila celata* (Say)—ORANGE-CROWNED WARBLER.

An abundant migrant, passing during the first half of May and late in September to the middle of October. Breeds north of United States except in mountains. Omaha, Lincoln, Beatrice, Peru, West Point, Neligh.

647. *Helminthophila peregrina* (Wilson)—TENNESSEE WARBLER.

A common migrant in eastern Nebraska, passing early in May and late in September, breeding north of us. Omaha, Lincoln, Peru, West Point, Sioux county.

648. *Compothlypis americana usneæ* Brewster—NORTHERN PARULA WARBLER.

Aughey says of the Parula Warbler that it reaches Nebraska about May 1, that it is found principally along timber belts and in orchards, and he has frequently seen the young soon after leaving the nest, but has never found the nest itself. The only addition to this record is a single male specimen taken April 20, 1901, near Havelock by Merritt Cary. This specimen agrees with Ridgway's new form, *C. a. ramalinae*, but until action is taken by the A. O. U. committee, our bird must be referred to *usneæ*.

650. *Dendroica tigrina* (Gmelin)—CAPE MAY WARBLER.

A rare migrant. Two definite records, a male taken at Alda, May

12, 1883, by F. W. Powell, and another at Omaha, May 24, 1893, by L. Skow. Breeds north of the United States.

652. *Dendroica aestiva* (Gmelin)—YELLOW WARBLER.

An abundant summer resident and breeder throughout the state, especially eastward; arriving the first week in May, breeding late in that month, through June and into July, and departing early in September.

654. *Dendroica caerulescens* (Gmelin)—BLACK-THROATED BLUE WARBLER.

This bird Aughey found present in small numbers during both spring and fall migrations, in eastern Nebraska, and he records shooting one at Lincoln in September, 1874. Bruner has noted it on rare occasions at both Omaha and West Point, but no other observers seem to have seen it. Breeds from northern states northward.

655. *Dendroica coronata* (Linnaeus)—MYRTLE WARBLER.

An abundant migrant in at least the eastern half of the state, uncommon westward. Arrives late in April and lingers until the middle of May, appearing again in October and present during most of that month. Aughey records finding young birds in eastern Nebraska on several occasions, and seeing birds in June, but it has not been seen in summer by recent observers, and, while offering no explanation of Aughey's observations, we cannot accept it as a breeder. Winters south of us.

656. *Dendroica auduboni* (Townsend)—AUDUBON WARBLER.

A very common summer resident among the pines of Sioux county, where it breeds. A nest was found May 20, 1900, by the expedition of that year, which, however, contained no eggs. On June 14, 1901, Cary found a nest in Warbonnet canyon from which a set of four fresh eggs was secured on the 27th of that month.

657. *Dendroica maculosa* (Gmelin)—MAGNOLIA WARBLER.

An uncommon migrant. Aughey records it as occasionally seen during migrations in northeastern Nebraska and of having taken one near Ponca in May, 1865. A specimen taken at Omaha by F. J. Breeze is now in Bruner's collection. Cary found them in fair numbers at Neligh during the spring migration, May 16 to 22, but not in the fall. Recorded twice from Lincoln. Breeds north of the United States.

658. *Dendroica rara* (Wilson)—CERULEAN WARBLER.

A rather common summer resident along the wooded bluffs of the Missouri river, where it breeds. In the vicinity of Omaha several nests have been found. It arrives early in May and departs late in August. Cary took a female at Neligh May 17, 1899.

659. *Dendroica pensylvanica* (Linnaeus)—CHESTNUT-SIDED WARBLER.

A common migrant along the eastern edge of the state. In the vicinity of Omaha it is frequently seen throughout the summer, and

has once been found breeding, a set of four eggs being taken by I. S. Trostler, June 23, 1894.

660. *Dendroica castanea* (Wilson)—BAY-BREASTED WARBLER.

The right of this warbler to be considered as a Nebraska bird rests entirely upon Aughey's record. He found it occasional in eastern Nebraska and took a specimen in September, 1874. This is an eastern species barely reaching the Missouri, and breeding from the northern states northward.

661. *Dendroica striata* (Forster)—BLACK-POLL WARBLER.

A common migrant over the eastern half of the state, passing through during the second and third weeks in May and in August. Breeds from the northern states northward. Omaha, Lincoln, Beatrice, Peru, West Point, Neligh, Cherry county.

662. *Dendroica blackburniæ* (Gmelin)—BLACKBURNIAN WARBLER.

Aughey states that he has occasionally seen this well marked warbler in the borders of woodlands in eastern Nebraska, and Bruner has noted it at West Point and Omaha. It breeds from northern Minnesota northward.

663a. *Dendroica dominica albilora* Ridgway—SYCAMORE WARBLER.

Aughey's record of *dominica* undoubtedly refers to this subspecies, which breeds in the Mississippi valley from Texas to central Illinois and eastern Kansas, and stragglers even to Wisconsin and Michigan. He says he has seen it only along the Nemaha in southeastern Nebraska, where he took a specimen in September, 1874; no one else has reported it. It probably occasionally breeds in the extreme southeastern part of the state.

667. *Dendroica virens* (Gmelin)—BLACK-THROATED GREEN WARBLER.

A rare migrant through eastern third of state. Aughey records taking three specimens in Dakota county June 5 and 6, 1865, and two in Lancaster county June 14, 1875. Bruner has observed it at Omaha, Florence, and Weeping Water. Cary reported it twice from Neligh, late in April, 1898, and May 4, 1899. Breeds from northern Illinois northward.

671. *Dendroica vigosii* (Audubon)—PINE WARBLER.

Aughey says this warbler occurs here during early spring and autumn, and that he took specimens in Dakota county in April, 1865, and Lancaster county in April, 1875 and 1877. He also took one Sept. 30, 1876. No other definite Nebraska records of this bird. It breeds from Minnesota and Manitoba southward, and may be found nesting in this state.

672. *Dendroica palmarum* (Gmelin)—PALM WARBLER.

Aughey recorded this species as abundant in eastern Nebraska, which it certainly is not now, but is rare. He noted it in both early spring and late fall, and took specimens April 10, 1875, and Oct. 1,

1876. The only other Nebraska record is a specimen taken at Omaha, May 4, 1893, by L. Skow. Breeds north of the United States.

673. *\*Dendroica discolor* (Vieillot)—PRAIRIE WARBLER.

Like the preceding Aughey recorded this species as abundant in eastern Nebraska, but recent observers do not find it so by any means. He found young in Dakota county and a nest in Richardson county near the Nemaha, and recorded specimens from the former locality June 1, 1865, and from Lancaster county Sept. 5 and 20, 1874, June 2 and 14, 1875, and June 4, 1877. Since then Bruner has noted it at West Point and Omaha, and L. Skow at the latter locality also. It should be found breeding in small numbers along the Missouri river, especially southward.

674. *\*Seiurus aurocapillus* (Linnaeus)—OVENBIRD.

A common summer resident; found throughout the state, but more especially eastward. Arrives first week in May, breeds in June, departs early in September. Omaha, Peru, Beatrice, Lincoln, West Point, Neligh, Sioux county.

675a. *\*Seiurus noveboracensis notabilis* Ridgway—GRINNELL WATER-THRUSH.

An uncommon migrant over the state, breeding in Sioux county. Passes during second and third week in May and early in September. Omaha, Lincoln, West Point, Neligh, Sioux county.

676. *\*Seiurus motacilla* (Vieillot)—LOUISIANA WATER-THRUSH.

Along the eastern edge of the state; breeding rather commonly in suitable localities along the bluffs of the Missouri river at Omaha and Peru, and in Richardson county. Occurring as a migrant a little farther west, at Lincoln, Beatrice, etc.

677. *\*Geothlypis formosa* (Wilson)—KENTUCKY WARBLER.

A common summer resident and breeder in the wooded ravines of the bluffs along the Missouri river, rarely as far west as Lincoln. Omaha, Peru, Lincoln—breeding.

679. *\*Geothlypis philadelphia* (Wilson)—MOURNING WARBLER.

Aughey found this bird in the eastern part of the state, and also found young birds being fed by the parents in the southeastern portion, thus establishing it as a breeder. L. Skow took two specimens at Omaha, May, 21, 1893, and Cary found it a not uncommon migrant at Neligh, May 16 to 24, 1899. No other records.

680. *Geothlypis tolmiei* (Townsend) MACGILLIVRAY WARBLER.

Aughey records noting this species in western Nebraska, probably along the Republican river, late in August, 1874. Cary noted it in Monroe canyon, Sioux county, May 27, 1900, and later during 1901, several times. Breeding probable.

681a. *\*Geothlypis trichas occidentalis* Brewster—WESTERN YELLOWTHROAT.

In the western part of the state, breeding abundantly in Sioux

county. During migrations specimens which approach this form, are found over the entire state, and such have been recorded from Lincoln, West Point, and Kennedy.

681d. *\*Geothlypis trichas brachidactyla* (Swainson)—NORTHERN YELLOW-THROAT.

This is the yellow-throat of the eastern portion of the state, where it is an abundant migrant and very common breeder, arriving the last week in April and remaining until late in September. Westward it grades into and finally becomes replaced by the preceding form. Omaha, Peru, Beatrice, Lincoln, Norfolk, West Point, Neligh, Holt county, Niobrara valley, Long Pine, Cherry county—breeding. The more western specimens are so nearly intermediate between this and the preceding that it is difficult to satisfactorily place them.

683. *\*Icteria virens* (Linnaeus)—YELLOW-BREASTED CHAT.

An abundant summer resident and breeder along the eastern edge of the state and a little westward; arriving the first week in May, breeding from late in May to July, departing in the middle of September. Omaha, Peru, Weeping Water, Lincoln, etc.

683a. *\*Icteria virens longicauda* (Lawrence)—LONG-TAILED CHAT.

This is the common chat of the state, of which breeding specimens from Sioux and Cherry counties and the Niobrara valley are typical, those from east central Nebraska grading into *virens* but nearer this form. Over the whole state during migrations. Lincoln, Beatrice, West Point, Neligh, Valentine, Thedford, Holdrege, etc. Dates about as for preceding.

684. *Wilsonia mitrata* (Gmelin)—HOODED WARBLER.

Aughey observed this well marked warbler along the Nemaha river in southeastern Nebraska on several occasions in September, 1874. Recent observers have not recorded it. Breeding very probable.

685. *Wilsonia pusilla* (Wilson)—WILSON WARBLER.

This bird Aughey found sparingly in both eastern and western Nebraska, and mentions especially one seen in southwestern Nebraska along the Republican late in August, 1874. There is every probability that this bird was a Pileolated Warbler, 685a. *W. p. pileolata* (Pallas), which form occurs east across the plains to Minnesota and Missouri, but in the absence of this or other specimens the status of this and typical *pusilla* cannot now be determined. The Wilson Warbler has been taken at both West Point and Omaha by Bruner, was found to be a common migrant at Neligh by Cary, April 28 to May 13 and Sept. 2, and was observed at Gresham by Dickinson. Breeds north of Nebraska.

686. *Wilsonia canadensis* (Linnaeus)—CANADIAN WARBLER.

Our only record of this bird seems to be the one by Aughey who observed it in spring in the eastern part of the state and shot a single

specimen on the Nemaha in Richardson county in the middle of May, 1875. Breeds north of Nebraska.

687. \**Setophaga ruticilla* (Linnaeus)—REDSTART.

An abundant breeder and summer resident over the state, arriving first week in May and departing in the middle of September. Omaha, Lincoln, Beatrice, West Point, Neligh, Long Pine, Cherry county, Holdrege, Sioux county—breeding.

EXTRALIMITAL: The Lutescent Warbler, 646a. *Helminthophila c. lutescens* Ridgway, may reach western Nebraska during migrations, as it occurs on the plains east of the Rockies in Colorado. 668. *Dendroica townsend* (Townsend)—The Townsend Warbler, a bird of western North America, found during migrations east to the plains of Wyoming (Cheyenne), Colorado (Ft. Lyon), and Texas, and accidental in Pennsylvania. 670. *Dendroica kirtlandii* Baird—The Kirtland Warbler. This rare warbler has been taken in Illinois, Michigan, Minnesota, Wisconsin, and Missouri, and its occurrence in Nebraska is possible. 678. *Geothlypis agilis* (Wilson), the Connecticut Warbler, of the eastern United States, has as yet no Nebraska record, but, as it occurs regularly west to Minnesota and casually even to Colorado, its ultimate inclusion in our fauna is but a matter of time.

FAMILY MOTACILLIDÆ—PIPITS

1. Tail about one-half inch shorter than wing, the inner web of its outer feather chiefly dusky; tarsus as long as hind toe and claw, feet dark; colors dull, obscure. . . . . Pipit.
1. Tail about three-fourths inch shorter than wing, the inner web of its outer feather chiefly white; tarsus shorter than hind toe and claw, feet pale; colors bright, distinct. . . . . Sprague Pipit.

679. *Anthus pensilvanicus* (Latham)—PIPIT.

A common migrant, passing in April and early in May and again late in September and in October; breeding far north. Omaha, Lincoln, West Point, Neligh.

700. *Anthus spragueii* (Audubon)—SPRAGUE PIPIT.

Migrant; not so common as preceding; same dates. Omaha, Lincoln, West Point.

FAMILY CINCLIDÆ—DIPPERS

Slaty gray, tinged with brown on head and neck; frequenting running streams. . . . . Dipper.

701. *Cinclus mexicanus* Swainson—DIPPER.

So far as known, the only record of this bird for Nebraska is of the one seen by Bruner on the White river in Sioux county west of Crawford in May, 1891. The bird was clearly seen sporting among the rocks along the stream. It is a common resident in Colorado and Wyoming and east into the Black hills.

## FAMILY TROGLODYTIDÆ—WRENS, THRASHERS, AND MOCKERS

1. Larger, wing  $3\frac{1}{2}$  to  $4\frac{1}{2}$  inches long; thrashers and mockers. . . . . (2)
1. Smaller, wing  $1\frac{1}{2}$  to  $2\frac{1}{2}$  inches long; wrens . . . . . (5)
  2. Under parts spotted (4)—not spotted. . . . . (3)
3. Slaty, with black crown and tail and chestnut under tail-coverts. . **Catbird.**
3. Gray above, soiled white below; band on wing and outer tail feathers white. . . . . **Mockingbird.**
3. Slightly lighter above, tinged with brownish below; wing-patch larger. . . . . **Western Mockingbird.**
  4. Above brownish gray; below spotted with triangular dusky spots. . . . . **Sage Thrasher.**
  4. Above rich rufous; below spotted with long brownish spots; two wing-bands. . . . . **Brown Thrasher.**
5. Upper parts brown, not barred nor streaked; a white line over eye; large wrens. . . . . (6)
5. Upper parts more or less barred crosswise; wings, tail and flanks fully barred; tail not fan shaped. . . . . (8)
5. Upper parts streaked lengthwise; flanks scarcely barred; marsh wrens tail not fan shaped. . . . . (10)
5. Upper parts dotted with dusky and whitish spots; tail broad and fan shaped. . . . . (12)
  6. Tail brownish, distinctly barred, shorter than wing; above reddish brown. . . . . **Carolina Wren.**
  6. Tail blackish, not fully barred, longer than wing; above grayish brown. . . . . (7)
7. Darker, more brownish above; beneath soiled white, flanks more brownish; smaller. . . . . **Bewick Wren.**
7. Paler, more grayish above; beneath pure white, flanks scarcely brownish; larger. . . . . **Texas Bewick Wren.**
  8. Tail much shorter than wings; above bright cinnamon, below pale cinnamon, heavily barred. . . . . **Winter Wren.**
  8. Tail as long as wings; above pale cinnamon, below gray washed with brownish, lightly barred . . . . . (9)
9. Darker, more reddish brown above, the bars obscure; darker below strongly brownish. . . . . **House Wren.**
9. Paler, more grayish brown above, the bars distinct; paler, almost white, below. . . . . **Western House Wren.**
  10. Crown streaked with white; bill under  $\frac{1}{2}$  inch long. . . . . **Short-billed Marsh Wren.**
  10. Crown not streaked; bill  $\frac{1}{2}$  inch or more long . . . . . (11)
11. Bars on middle tail feathers and both tail-coverts indistinct or lacking. . . . . **Long-billed Marsh Wren.**
11. Bars on middle tail feathers and tail-coverts distinct, continuous; paler. . . . . **Interior Tule Wren.**
  12. Belly, rump, and tail rusty; back rusty brown; throat white . . . . . **Canyon Wren.**



12. Whole under parts whitish; back grayish brown, rump rusty  
 ..... Rock Wren.

702. *Oroscoptes montanus* (Townsend)—SAGE THRASHER.

Rare, and so far as known, confined to northwestern Nebraska. Baird's "Nebraska" records are now extralimital, referring to Ft. Laramie and the Black hills. A. K. Fisher saw a single bird at a distance of six feet at Alliance, Box Butte county, July 12, 1893, and it has been found nesting within a half mile of the Nebraska line in Wyoming; May 20, 1900, by Cary and Carriker. Residents of the Hat Creek valley report it as occasional in that region.

703. *Mimus polyglottos* (Linnaeus)—MOCKINGBIRD, and

703a. *Mimus polyglottos leucopterus* (Vigors)—WESTERN MOCKINGBIRD.

This bird is found throughout the entire state; south of the Platte a common summer resident and breeder; rare north of middle of state. Arrives in the middle of April, breeds in June, departs about the middle of October. Rulo, Nebraska City, Weeping Water, Lincoln, Beatrice, Franklin, Kearney, North Platte, McCook, Stratton, Haigler, Sidney—breeding; even north to Sioux county, though not common—breeding. Specimens from the last locality much paler in color and with more extended white markings than eastern birds have been identified by Witmer Stone as *leucopterus*, and there is no doubt the Sidney record refers to the same form. In regard to the records from other localities westward, however, it is impossible, in the absence of specimens, to make a definite statement; nor is it possible to limit the range of the two in the state.

704. *Galeoscoptes carolinensis* (Linnaeus)—CATBIRD.

Whole of state; abundant eastward, common westward, arriving the first week in May, breeding in June, departing late in September.

705. *Toxostoma rufum* (Linnaeus)—BROWN THRASHER.

Over the entire state; abundant except in the more western portions, breeding throughout. Arrives late in April, breeds late in May, and in June, departs late in September.

715. *Salpinctes obsoletus* (Say)—ROCK WREN.

An abundant breeder in the Pine ridge country of northwest Nebraska, south through Scott's Bluff and Banner to Kimball and Cheyenne counties, east through Dawes and Sheridan counties to the Minnechadzu and Gorden canyons in Cherry county, breeding in the rim-rocks in June. Aughey records finding a nest in an old slab pile near Dakota City, June 3, 1865, and another in an old stump along Salt creek in June, 1875, but recent observers have noted it as a migrant only in eastern Nebraska. Neligh, West Point, Lincoln—migrating in late April and early May.

[717a. *Catherpes mexicanus conspersus* Ridgway—CANYON WREN.

In Sioux county in a canyon on White river between Glen and Andrews, Aug. 12, 1903, Bruner saw a wren which he identified as

this species, but did not secure the specimen. There can be little doubt as to the correctness of the identification, but it is deemed advisable to withhold this bird from full standing in the list until the taking of a specimen places the record beyond all doubt, since it is a rare species in both Colorado and Wyoming.]

718. *Thryothorus ludovicianus* (Latham)—CAROLINA WREN.

Aughey saw this bird but once in Nebraska, in Richardson county, June 12, 1875. Bruner saw it again years afterward at Rulo in the same county. The third and last instance of its occurrence was a specimen taken at Roca, Feb. 20, 1902, by J. S. Hunter (See Proc. N. O. U. III, p. 108). It is probably a rare resident in the extreme southeastern part of the state.

719. *\*Thryomanes bewickii* (Audubon)—BEWICK WREN.

Aughey's record stands alone for this bird in Nebraska. He found a nest near the Missouri river in Otoe county, June 12, 1875, and watched the parents feed their young with small locusts.

The recording of *T. b. bairdii* (in part *cryptus*) from Nebraska was a guess by Taylor as to the identity of Aughey's specimen. Since the rearrangement of the subspecies, (See Proc. U. S. Nat. Mus., XXI, pp. 421-450) the only other form likely to occur in this state is 719c. *T. b. cryptus* Oberholser, the Texas Bewick Wren, which is found north to Kansas and eastern Colorado and may straggle into western Nebraska.

[721. *Troglodytes aedon* Vieillot—HOUSE WREN.

Both eastern and western forms of this species have been recorded from this state, but a careful examination proves them *all* to refer to the western subspecies. The western range of *aedon* is to Indiana and Illinois and it probably never reaches this state.]

721a. *\*Troglodytes aedon aztecus* (Baird)—WESTERN HOUSE WREN.

Entire state, abundant summer resident and breeder; arriving in the middle of April, breeding in the latter part of May, and in June and departing late in September and in October, though lingering even to the first of November.

722. *Olbiorchilus hiemalis* (Vieillot)—WINTER WREN.

Rather rare winter resident, appearing in the middle of September and present until March. Omaha, Peru, Dunbar, Blair, West Point, Neligh, Lincoln. Breeds north of this state.

724. *\*Cistothorus stellaris* (Lichtenstein)—SHORT-BILLED MARSH WREN.

An uncommon migrant and rare summer resident in eastern Nebraska. Aughey found a nest in a marsh in Dixon county in 1867, the only time he found it breeding. It has also been found at Omaha, West Point, and Lincoln in summer, and nests have been found at the two latter localities (See Proc. N. O. U. III, p. 108).

725. \**Telmatodytes palustris* (Wilson)—LONG-BILLED MARSH WREN.

A very common migrant and a common summer resident, arriving in the middle of April, breeding in the latter part of June and early in July and departing in September. Abundant breeder in the sand-hill lake region of Cherry county, common everywhere in marshes in the state. Omaha, Tekamah, West Point, Lincoln, Beatrice, York, Neligh.

EXTRALIMITAL: 725c. *Telmatodytes p. plesius* Oberholser, the Interior Tule Wren, is the form breeding in Colorado and Wyoming and has been taken to within a few miles of the state line, so may be found in western Nebraska during migrations.

FAMILY CETHIIDÆ—CREEPERS

1. Browner above, with tawny of rump less distinctly contrasted with color of back; smaller, with a shorter bill (wing  $2\frac{3}{8}$  to  $2\frac{7}{10}$ , tail  $2\frac{1}{2}$  to  $2\frac{9}{10}$  inches) ..... **Brown Creeper.**
  1. Grayer above, with tawny of rump more distinctly contrasted with color of back; larger, with a longer bill (wing  $2\frac{1}{2}$  to  $2\frac{7}{10}$ , tail  $2\frac{7}{10}$  to  $2\frac{3}{4}$ , bill  $\frac{7}{10}$  to  $\frac{1}{2}$  inches) ..... **Rocky Mountain Creeper.**
726. \**Certhia familiaris americana* (Bonaparte)—BROWN CREEPER.

Eastern Nebraska, resident; common all winter in more southern parts, less so northward, rare between middle April and early October when most of them go north to breed. Aughey "found a nest of this bird in a knot-hole in the timber near Dakota City, in June, 1865," and Trostler has evidence of its breeding near Omaha, rarely. Rulo, Dunbar, Omaha, West Point, Ponca, Neligh, Lincoln, Beatrice. The westernmost record is from St. Michael just east of the 99th meridian.

726a. *Certhia familiaris montana* Ridgway—ROCKY MOUNTAIN CREEPER.

Sioux county in winter. The specimen taken there Feb. 17, 1896, and on which the only existing record was based, has been examined by Oberholser who confirms the identification. It is rare in Sioux county and ascends to higher altitudes in spring, probably early in April.

FAMILY PARIDÆ—NUTHATCHES AND TITMICE

1. Tail square, only about half as long as wing ..... (2)
1. Tail rounded, about as long as wing ..... (5)
  2. Larger, wing about  $3\frac{1}{2}$  inches; below white, rusty on flanks and under tail-coverts only ..... (3)
  2. Smaller, wing about  $2\frac{1}{2}$  inches; whole under parts tinged with brownish, often bright rusty. .... (4)
3. Above lighter, more plumbeous, tertials light bluish gray with large, sharply defined, oblong patches of black, the one on outer web of third feather rounded at end; sides of neck grayish white; smaller wing about  $3\frac{3}{8}$  inches, bill shorter, stouter ..... **White-breasted Nuthatch.**
3. Above darker, more slaty; tertials dark bluish gray with narrower,

- less sharply defined black patches, the one on outer web of third feather pointed at end; sides of neck pure white; larger, wing about  $3\frac{1}{2}$  inches, bill longer, more slender. . . **Rocky Mountain Nuthatch.**
4. Crown black (male) or gray like back (female), with a black line through eye and a white one over it; under parts usually bright rusty; no spot on nape. . . . . **Red-bellied Nuthatch.**
4. Crown dull brownish (adult) or gray like back (young) changing to blackish before and behind eye, but no white line over eye; nape with a poorly defined white spot. . . . . **Pygmy Nuthatch.**
5. Head conspicuously crested; above ashy with black forehead, below dull white. . . . . **Tufted Titmouse.**
5. Head not crested; top of head and throat glossy black. . . . . (6)
6. Forehead and line over eye white; wings scarcely edged with white. . . . . **Mountain Chickadee.**
6. Forehead black, no line over eye; wings broadly white-edged. . . (7)
7. Colors darker, above olive-gray, wings and tail moderately edged with hoary, the latter not so terminally; smaller with shorter tail ( $2\frac{1}{2}$  to  $2\frac{3}{4}$  inches); black on head less extensive, white less pure. . . **Chickadee.**
7. Colors paler, above pure ash-gray, wings and tail very broadly edged with hoary, that on latter generally passing around the tips, that on former much broader on tertials and greater wing-coverts; larger, with longer tail ( $2\frac{3}{4}$  to 3 inches); black on head more extensive on nape and reaching breast, sides of head pure white. . . . . **Long-tailed Chickadee.**
727. **\*Sitta carolinensis** Latham—WHITE-BELLIED NUTHATCH.  
Greater part of state, eastward; common resident and breeder. Omaha, Lincoln, West Point, Blair, Tekamah, Ponca, Neligh, Long Pine, etc. Breeds usually in April and May.
- 727c. **\*Sitta carolinensis nelsoni** Mearns—ROCKY MOUNTAIN NUTHATCH.  
Sioux county, common resident and breeder. Oberholser has verified this identification in regard to both winter specimens and breeding birds. To this form refer all the previous valid Nebraska records of *aculeata*.
728. **Sitta canadensis** Linnaeus—RED-BELLIED NUTHATCH.  
Whole state; uncommon winter resident, present from the middle of October until the middle of May. There is much circumstantial evidence to indicate the breeding of this bird in the state, but as yet no definite record. Omaha, Dunbar, Lincoln, Dakota City, Neligh, Long Pine, Sioux county. The earliest Lincoln record is October 26, 1903, (Swenk), the latest May 10, 1898 (J. S. Hunter).
730. **Sitta pygmaea** Vigors—PYGMY NUTHATCH.  
A fall and winter visitor in the pine clad region of northwest Nebraska. Aughey met with this bird once (1877) in the "timbered bottoms and bluffs of the Niobrara river on the northern border of the state." The Sioux county records for the "Brown-headed Nut

hatch," (see Bruner, Birds of Nebraska, p. 160), on Feb. 26, 1896 (L. Skow), and for the "Hudsonian Chickadee," on Dec. 13, 1895 (L. Bruner), were both misidentifications and should refer to this species. The Omaha records for the "Pygmy Nuthatch" (l. c. p. 160) refer probably to immature examples of the Red-bellied. Ascends to higher parts in March and not breeding in the state.

731. *Bæolophus bicolor* (Linnaeus)—TUFTED TITMOUSE.

Not uncommon (locally) in eastern Nebraska in more heavily timbered districts, rare elsewhere and not present west of 98th meridian. Resident, and with little doubt a breeder, but as yet there is no taking of a nest recorded. Rulo, Peru, Dunbar, Omaha, Tekamah, West Point, Dakota City, Neligh, Lincoln.

735. *\*Parus atricapillus* Linnaeus—CHICKADEE.

In extreme eastern Nebraska an occasional chickadee is found nearer to *atricapillus* than the following form, but such are not plentiful and most of the eastern Nebraska birds are intermediates. Omaha, Lincoln, Beatrice—breeding.

735a. *\*Parus atricapillus septentrionalis* (Harris)—LONG-TAILED CHICKADEE.

Entire state; abundant resident, eastward running into preceding form; breeding in April and May. Sioux and Cherry counties, Niobrara valley, Neligh, West Point, Tekamah, Omaha, Dunbar, Lincoln, Beatrice—breeding.

[738. *Parus gambeli* Ridgway—MOUNTAIN CHICKADEE.

Baird's record referred to what is now Wyoming, so this must be dropped as a Nebraska bird. However it occurs at Cheyenne, Wyo., commonly, and may reach northwest Nebraska in winter.]

FAMILY SYLVIIDÆ—KINGLETS AND GNATCATCHERS

1. Outer tail feather white; bluish gray, with blackish wings and tail . . . . . Blue-gray Gnatcatcher.
1. Outer tail feather not white; above olive-green, below whitish. . . . . (2)
  2. A yellow crown patch bordered by black on the sides. . . . . Golden-crowned Kinglet.
  2. A ruby crown patch (male) or none (female), and no black . . . . . Ruby-crowned Kinglet.

748. *Regulus satrapa* Lichtenstein—GOLDEN-CROWNED KINGLET.

Migratory, common; passing in April and October, but rarely wintering. Breeds north of Nebraska. Omaha, Lincoln, West Point, Dakota City, Neligh, York, Long Pine.

749. *Regulus calendula* (Linnaeus)—RUBY-CROWNED KINGLET.

Migratory, commoner than preceding, appearing early in April and lingering often until the middle of May, breeding north of us, returning early in October, and lingering through that month, occasionally wintering. Omaha, Peru, Lincoln, Beatrice, York, West Point, Dakota City, Neligh.

751. \**Polioptila caerulea* (Linnaeus)—BLUE-GRAY GNATCATCHER.

Common migrant, passing in April and late in September over the eastern third of the state, breeding in suitable localities along the Missouri river, especially in the vicinity of Omaha, where several nests have been taken. Omaha, Peru, Lincoln, Beatrice, West Point, Dakota City, Neligh.

## FAMILY TURDIDÆ—THRUSHES, BLUEBIRDS, AND SOLITAIRES

1. Color ashy, with outer tail feathers white tipped, a buff wing-band and pale eye-ring; no blue in plumage, not spotted below. . . . . Townsend Solitaire.
1. Color gray, with upper tail-coverts and base of tail white, rest of tail, wings, and cheeks black, throat and breast pale buff unspotted. . . . . Greenland Wheatear.
1. Color above slaty, below mostly rusty brown, breast unspotted in adult, plumage without blue. . . . . (2)
1. Color below white spotted with dark and no chestnut; no blue in plumage. . . . . (4)
1. Color mostly blue. . . . . (10)
  2. A black band across breast; throat and line behind eye rusty. . . . . Varied Thrush.
  2. No black band across breast; throat white with black spots. . . (3)
3. Under tail feathers with distinct white tips on first two pairs; black of hind neck grading into slaty gray of back, which is spotted with black. . . . . Robin.
3. Under tail feathers without distinct white tips; black of hind neck abruptly defined against pale slaty gray back, which lacks the black spots. . . . . Western Robin.
4. Rufous tail and upper tail-coverts decidedly brighter than olive-brown back. . . . . (5)
4. Back and tail of practically the same color. . . . . (6)
4. Olive rump and tail decidedly duller than bright cinnamon-brown back; breast and sides with many round black spots Wood Thrush.
5. Above dull brown, more smoky in winter, flanks olive brownish; smaller, wing  $3\frac{1}{2}$  to  $3\frac{3}{4}$ , tail  $2\frac{1}{2}$  to 3 inches; bill heavier . . . . . Hermit Thrush.
5. Above grayish brown, more olivaceous in winter; flanks light grayish; larger, wing 4 to  $4\frac{1}{2}$ , tail about  $3\frac{1}{2}$  inches; bill slenderer . . . . . Audubon Hermit Thrush.
6. Upper parts cinnamon-brown throughout (7)—olive throughout. (8)
7. Upper parts light tawny brown, sides of throat cream-buff with only the very center immaculate, breast light tawny buff marked by narrower more pencilled brownish spots, sides white slightly tinged with grayish, under mandible not tipped with brown or but very slightly so. . . . . Wilson Thrush.
7. Upper parts olivaceous tawny most tawny on the rump, throat almost immaculate and unmarked, breast dark olivaceous buff more heavily marked with blunt arrow shaped fuscous spots, sides white strongly

- tinged with olivaceous, under mandible horn color tipped with brown.  
 ..... **Willow Thrush.**
8. Throat, breast, cheeks, eye-ring, and lores gray with a very slight  
 buffy tinge. .... **Gray-cheeked Thrush.**
8. Throat, breast, cheeks, eye-ring, and lores deep cream buff. . . . (9)
9. Upper parts more olivaceous, sides and flanks less grayish. ....  
 ..... **Olive-backed Thrush.**
9. Upper parts more grayish, especially on rump and upper tail-coverts;  
 sides, and flanks more grayish. .... **Alma Thrush.**
- 10 Whole upper parts blue (11)—middle of back chestnut. ....
- ..... **Western Bluebird.**
11. Throat and breast chestnut. .... **Bluebird.**
11. Throat and breast not chestnut, but pale blue. .... **Mountain Bluebird.**
754. *\*Myadestes townsendii* (Audubon)—TOWNSEND SOLITAIRE.  
 Resident in northwest Nebraska. Common summer resident in  
 Sioux county, breeding in the latter part of May, in winter spreading  
 eastward over the entire state. Valentine, Long Pine, Niobrara  
 valley, Neligh, Norfolk, Alda, Lincoln, Beatrice—wintering.
755. *\*Hylocichla mustelina* (Gmelin)—WOOD THRUSH.  
 Entire state; abundant summer resident and breeder eastward, un-  
 commonly so westward; arriving first week in May, breeding in June,  
 departing by the middle of September. Omaha, Lincoln, Beatrice,  
 Peru, West Point, Dakota City, Neligh, Long Pine, Sioux county—  
 breeding.
- [756. *Hylocichla fuscescens* Stephens, the Wilson Thrush, is the form of  
 Eastern North America west to Missouri (see Howe, Auk, XVII, pp.  
 18-25), but may straggle west into eastern Nebraska. However, in  
 the absence of specimens, all our records are referred to the fol-  
 lowing.]
- 756a. *Hylocichla fuscescens salicicola* Ridgway—WILLOW THRUSH.  
 An uncommon migrant, arriving the first week in May and lingering  
 into June, departing early in September. It is probably an occa-  
 sional breeder, but as yet the only evidence of its nesting is a pair seen  
 by Wolcott near Lincoln June 2, 1898, in a locality very favorable for  
 that purpose, the male in full song. Richardson county, Omaha,  
 Lincoln, West Point.
757. *Hylocichla aliciae* (Baird)—GRAY-CHEEKED THRUSH.  
 An uncommon migrant, passing through in the middle of May to  
 breed north of the United States. Beatrice, Lincoln—migrating.
- 758a. *Hylocichla ustulata swainsonii* (Cabanis)—OLIVE-BACKED THRUSH.  
 An abundant migrant in eastern Nebraska, arriving the first week  
 in May or a little earlier, lingering until well into June, breeding north  
 of the state, reappearing in early September and present most of that  
 month. Omaha, Lincoln, West Point, Neligh, Kearney, Long Pine,  
 Valentine.

758b. *Hylocichla ustulata almæ* Oberholser—ALMA THRUSH.

The western or mountain form of *ustulata* and a common migrant in Sioux county, arriving about the middle of May and a few lingering through the summer in Warbonnet canyon, where it may breed. Oberholser has kindly verified this determination. Some, possibly most, of the records provisionally placed under the preceding form may belong to this recently differentiated race, especially those from Valentine and Long Pine.

759a *Hylocichla guttata auduboni* (Baird)—AUDUBON HERMIT THRUSH.

Migratory; our only definite record is of a specimen taken at Lincoln April 9, 1900, by M. A. Carriker, Jr., and identified by Oberholser as *auduboni*. Probably a number of the records placed provisionally under the next form belong here.

759b. *Hylocichla guttata pallasii* (Cabanis)—HERMIT THRUSH.

An uncommon migrant in eastern Nebraska, arriving the first week in April and lingering through May, reappearing late in September. The breeding record from Alda by F. W. Powell (Bull 2. Div. Orn. p. 287) was probably a mistake. Omaha, Lincoln, Fairbury, West Point, Dakota county.

761. \**Merula migratoria* (Linnaeus)—ROBIN.

Over the whole state, abundant summer resident and breeder; arriving the first week in March, breeding from the middle of April through May and June, departing late in October and early in November, present in small numbers all winter. Westward runs into the following form, but typical *migratoria* occurs over the state, though less common westward. Omaha, Lincoln, West Point, Neligh, Cherry and Sioux counties—breeding.

761a. \**Merula migratoria propinqua* Ridgway—WESTERN ROBIN.

Western Nebraska, not recorded east of the 100th meridian even during migrations. Most of our Western birds are intermediates with an occasional well-defined *propinqua*. Breeds in Sioux county, east in migrations to Curtis. Dates as for preceding, or somewhat later.

766. \**Sialia sialis* (Linnaeus)—BLUEBIRD.

Entire state; abundant eastward but rare westward; arriving first week in March, breeding from early in May to the middle of July, departing from late in September to the middle of October, rarely wintering. Omaha, Peru, Lincoln, Beatrice, West Point, Neligh, Long Pine, and Cherry and Sioux counties—breeding, even in the latter locality.

767a. *Sialia mexicana bairdi* Ridgway—CHESTNUT-BACKED BLUEBIRD.

Accidental. A bird of the west, occurring regularly as a migrant along the eastern base of the Rockies, accidental east to Iowa and Minnesota. Included on Aughey's record, who reported it as "rare"



in the state, and to have seen "it for the first time in August on the Niobrara, about seven miles from its mouth in a dense timber." He was close enough to observe its feeding habits.

768 \**Sialia arctica* Swainson—MOUNTAIN BLUEBIRD.

Western Nebraska; Sioux and Dawes to Kimball and Cheyenne counties, breeding commonly in the higher parts of Pine Ridge in late May and June.

EXTRALIMITAL: 763. *Ixoreus naevius* (Gmelin), the Varied Thrush, of the Pacific coast has straggled east even to the Atlantic coast; 765a. *Saxicola ænanthe leucorhoa* (Gmelin), the Greenland Wheatear, has occurred in winter (accidentally) in New York, Maine, Michigan, and even Louisiana and Colorado.



# INDEX.

## PROCEEDINGS STATE BOARD OF AGRICULTURE.

### Addresses by

W. A. Henry.....	94
Prof. John Hamilton.....	105
Prof. John Hopkins.....	89
W. P. Snyder.....	151
President.....	154
Dr. H. P. Miller.....	145
Reuben E. Blodgett.....	156
Alfalfa.....	252
Annual Meeting.....	5
Auditing Committee, Report of.....	50
Barbour, Erwin H.—Cement and Its Uses on the Farm (Illust.).....	283
Bell, C. E.—Diseases Arising from Improper Pruning.....	157
Remedies.....	160
Bessey, Charles E.—Some Foreign Botanical Gardens and Parks.....	82
Distribution of the Native Forest Trees in Nebraska.....	257
Burnett, E. A.—Comparison of Shelter and Rations in Feeding Steers.....	237
Raising Calves for Beef Production.....	241
Burnett, E. A. and Smith, H. R.—Pig Feeding Experiment, etc.....	201
Feeding Experiments with Cattle and Pigs.....	225
Wintering Calves on Roughness.....	246
Corn vs. wheat for pigs.....	251
Chapel exercises.....	67
Cement.....	283
Comparative Statement of the State Board of Agriculture.....	12
Commercial orcharding.....	142
Corn improvement in Nebraska.....	155
Counties.....	48
County collective exhibits.....	116
Cows.....	161
Dole, E. W. and W. A.—Ornamentals for Outdoor Planting.....	146
Election of officers.....	74
Experiments with the Dairy Herds.....	161
Fifth session.....	88
Fourth Session.....	93
Frey, Irwin F.—Carnations.....	126
Haecker, Prof. A. L.—The Herd Record.....	161
Ration Tests for Dairy Cows.....	170
Best Wheat in a Cow's Lactation Period.....	173

# INDEX

Hall, Joseph—Corn Improvement in Nebraska.....	155
Hamilton, Prof. John.—The Relation of the Farmer's Institute to Our National System of Agricultural Education.....	105
Harris, J. A.—Some things I Have Learned.....	128
Hervey, G. W.—The Range Steer and His Relations to the Commer- cial Interests of the World.....	139
Hopkins, Cyril G.—Experiments in Corn Breeding.....	130
Illustrations—	
Cows .....	166
Trees.....	263, 267, 271, 275, 277, 270
Cement.....	284-290
Jansen, Peter—Sheep Feeding.....	123
Lands Most Suitable to Plant, and Care of the Orchard in Central Ne- braska.....	121
Lyon, Prof. T. L. and A. T. Wiancko—Experiments in the Culture of Sugar Beets in Nebraska.....	176
Lyon, Prof. T. L.—Co-operative Variety Tests of Corn.....	185
Macaroni Wheat.....	204
Marshall, G. A.—Commercial Orcharding.....	142
Members of State Board.....	6
Nebraska, a State of Unequaled Resources.....	253
Officers.....	5
Officers of the Board.....	6
Official Tabulated Reports.....	41
President's Annual Address.....	8
President's Address.....	154
Proceedings of the Semi-Annual Meeting.....	5
Public Comfort Building.....	114
Recommendations.....	52
Reports of—	
Auditing committee.....	50
Board of managers.....	51
Committee on nomination.....	72
Committee on premium list.....	77
Committee on recommendation of officers.....	63
Secretary.....	22
Superintendent of gates.....	21
Representatives from county agricultural societies.....	7
Second session.....	58
Secretary's Annual Report.....	22
Semi-annual meeting.....	5
Skinner, Prof. J. H.—Breeding, Care and Feeding of Hogs.....	134
Best type of horse for the Farmer.....	137
Smith, H. R.—Wheat Compared with other Grains for Pigs.....	248
Snyder, W. P.—The Duroc-Jersey as the Farmer's Hog.....	151
Stillson, L. D.—How to Care for the Dairy Cow.....	149
Sugar beets.....	176
Trees in Nebraska.....	257
Treasurer's annual report.....	10
Treasurer's financial statement.....	13

# INDEX

## BIRDS OF NEBRASKA.

<i>Acanthis linaria</i> .....	84	<i>Bæolophus bicolor</i> .....	112
<i>Linaria rostrata</i> .....	84	<i>Baldpate</i> .....	25, 27
<i>Linaria holboëllii</i> .....	84	<i>Bartramia longicauda</i> .....	42
<i>Accipiter atricapillus</i> .....	51	Birds in Relation to Agriculture	
<i>Atricapillus striatulus</i> .....	51	and Horticulture.....	5-11
<i>Cooperi</i> .....	50	<i>Bittern, American</i> .....	32, 33
<i>Velox</i> .....	50	<i>Least</i> .....	32, 33
<i>Actitis macularia</i> .....	42	<i>Blackbird, Brewer</i> .....	73, 75
<i>Actodromas bairdii</i> .....	40	<i>Northern Red-winged</i> .....	72, 73, 74
<i>Fuscicollis</i> .....	40	<i>Red-winged</i> .....	72, 73, 74
<i>Maculata</i> .....	40	<i>Rusty</i> .....	73, 75
<i>Minutilla</i> .....	40	<i>Yellow-headed</i> .....	72, 73, 74
<i>Aechmophorus occidentalis</i> .....	16	<i>Bluebird</i> .....	114, 115
<i>Aegialitis melodia circumcincta</i> .....	44	<i>Chestnut-backed</i> .....	114, 115
<i>Nivosa</i> .....	44	<i>Mountain</i> .....	114, 116
<i>Sempalmata</i> .....	44	<i>Bobolink</i> .....	72, 73, 74
<i>Aeronautes melanoleucus</i> .....	62	<i>Bobwhite</i> .....	45
<i>Agelaius phoeniceus</i> .....	74	<i>Bonasa umbellus</i> .....	46
<i>Phoeniceus fortis</i> .....	74	<i>Botaurus lentiginosus</i> .....	33
<i>Aix sponsa</i> .....	28	<i>Brant</i> .....	23, 30
<i>Ammodramus henslowii</i> .....	86	<i>Branta bernicla glaucogastra</i> .....	30
<i>Henslowii occidentalis</i> .....	86	<i>Canadensis</i> .....	30
<i>Leconteii</i> .....	86	<i>Canadensis hutchinsii</i> .....	30
<i>Nelsoni</i> .....	87	<i>Canadensis minima</i> .....	31
<i>Ampelis cedrorum</i> .....	94	<i>Bubo virginianus</i> .....	56
<i>Garrulus</i> .....	94	<i>Virginianus pallescens</i> .....	56
<i>Ampelocoma woodhouseii</i> .....	71	<i>Virginianus arcticus</i> .....	56
<i>Amphispiza belli nevadensis</i> .....	92	<i>Bufflehead</i> .....	29
<i>Anas boschas</i> .....	26	<i>Bunting, Indigo</i> .....	79, 91
<i>Fulvigula maculosa</i> .....	31	<i>Lark</i> .....	78, 82, 92
<i>Obscura</i> .....	26	<i>Lazuli</i> .....	79, 92
<i>Obscura rubripes</i> .....	26	<i>Painted</i> .....	79, 92
<i>Anhinga</i> .....	21, 22	<i>Snow</i> .....	77, 84
<i>Anser albifrons gambeli</i> .....	30	<i>Varied</i> .....	79, 92
<i>Anthus pensilvanicus</i> .....	106	<i>Buteo borealis</i> .....	51
<i>Spragueii</i> .....	106	<i>Borealis calurus</i> .....	51
<i>Antrostomus vociferus</i> .....	61	<i>Borealis harlani</i> .....	51
<i>Aquila chrysaetos</i> .....	52	<i>Borealis kliderii</i> .....	51
<i>Archibuteo ferrugineus</i> .....	52	<i>Lineatus</i> .....	51
<i>Lagopus sacti-johannis</i> .....	52	<i>Platypterus</i> .....	51
<i>Ardea herodias</i> .....	33	<i>Swainsoni</i> .....	51
<i>Ardetta exilis</i> .....	33	<i>Butorides virescens</i> .....	34
<i>Arenaria morinella</i> .....	45		
<i>Arquatella maritima</i> .....	43	<i>Calamospiza melanocorys</i> .....	92
<i>Asio accipitrinus</i> .....	55	<i>Calcarius lapponicus</i> .....	84
<i>Wilsonianus</i> .....	55	<i>Lapponicus alascensis</i> .....	85
<i>Astragalinus tristis</i> .....	84	<i>Ornatus</i> .....	85
<i>Tristis pallidus</i> .....	84	<i>Pictus</i> .....	85
<i>Asyndesmus torquatus</i> .....	60	<i>Calidris arenaria</i> .....	41
<i>Avocet</i> .....	37	<i>Canvasback</i> .....	25, 28
<i>Aythya affinis</i> .....	28	<i>Cardinal</i> .....	77, 91
<i>Americana</i> .....	28	<i>Cardinalis cardinalis</i> .....	91
<i>Collaris</i> .....	28	<i>Carpodacus cassini</i> .....	83
<i>Marila</i> .....	28	<i>Mexicanus frontalis</i> .....	83
<i>Vallisneria</i> .....	28	<i>Purpureus</i> .....	83

# INDEX

Catbird. . . . .	107, 108
Cathartes aura. . . . .	48
Catharista urubu. . . . .	48
Catherpes mexicanus conspersus	108
Centrocercus urophasianus. . . . .	46
Centurus carolinus. . . . .	60
Ceophloeus pileatus abieticola. . . . .	60
Certhia familiaris americana. . . . .	110
Familiaris montana. . . . .	110
Ceryle alcyon. . . . .	57
Chaetura pelagica. . . . .	62
Charadrius dominicus. . . . .	44
Charitonetta albeola. . . . .	29
Chat, Long-tailed. . . . .	100, 105
Yellow-breasted. . . . .	100, 105
Chaulelasmus streperus. . . . .	26
Chen caerulescens. . . . .	30
Hyperborea. . . . .	30
Hyperborea nivalis. . . . .	30
Chickadee. . . . .	111, 112
Hudsonian. . . . .	112
Long-tailed. . . . .	111, 112
Mountain. . . . .	111, 112
Chondestes grammacus. . . . .	87
Grammacus strigatus. . . . .	87
Chordeiles virginianus. . . . .	62
Virginianus henryi. . . . .	62
Virginianus sennetti. . . . .	62
Cinclus mexicanus. . . . .	106
Circus hudsonius. . . . .	50
Cistothorus stellaris. . . . .	109
Clangula clangula americana. . . . .	28
Islandica. . . . .	28
Coccyzus americanus. . . . .	57
Americanus occidentalis. . . . .	57
Erythrophthalmus. . . . .	57
Colaptes auratus luteus. . . . .	60
Cafer collaris. . . . .	60
Colinus virginianus. . . . .	45
Colymbus auritus. . . . .	16
Holboellii. . . . .	16
Nigricollis californicus. . . . .	16
Compsothlypis americana usneæ	101
Americana ramalinæ. . . . .	101
Contopus richardsonii. . . . .	67
Virens. . . . .	67
Conurus carolinensis. . . . .	56
Coot. . . . .	35, 36
Cormorant, Double-crested . . . . .	22
Florida. . . . .	22
Mexican. . . . .	22
Corvus americanus. . . . .	71
Corax principalis. . . . .	71
Corax sinuatus. . . . .	71
Cryptoleucus. . . . .	71
Coturniculus bairdii. . . . .	86
Savannarum bimaculatus . . . . .	86
Savannarum passerinus. . . . .	86
Cowbird. . . . .	73, 74

Crane, Little brown. . . . .	34
Sandhill. . . . .	34
Whooping. . . . .	34
Creeper, Brown. . . . .	100
Rocky Mountain. . . . .	110
Crossbill, Bendire. . . . .	83
Mexican. . . . .	76, 83
Red. . . . .	76, 83
White-winged. . . . .	76, 83
Crow. . . . .	70, 71
Crymophilus fulicarius. . . . .	37
Cuckoo, Black-billed. . . . .	57
California. . . . .	57
Yellow-billed. . . . .	57
Curlew, Eskimo. . . . .	38, 43
Hudsonian. . . . .	38, 43
Long-billed. . . . .	38, 42
Cyanocitta cristata. . . . .	70
Stelleri annectens. . . . .	71
Stelleri diademata. . . . .	71
Cyanospiza amœna. . . . .	92
Ciris. . . . .	92
Cyanea. . . . .	91
Versicolor. . . . .	92
Dafila acuta. . . . .	27
Dendragapus obscurus. . . . .	46
Dendroica æstiva. . . . .	102
Auduboni. . . . .	102
Blackburniæ. . . . .	103
Cærulescens. . . . .	102
Castanea. . . . .	103
Coronata. . . . .	102
Discolor. . . . .	104
Dominica albilora. . . . .	103
Maculosa. . . . .	102
Pennsylvanica. . . . .	102
Palmarum. . . . .	103
Rara. . . . .	102
Striata. . . . .	103
Tigrina. . . . .	101
Vigorsii. . . . .	103
Virens. . . . .	103
Dickcissel. . . . .	81, 92
Dipper. . . . .	106
Dolichonyx oryzivorus. . . . .	74
Dove, Mourning. . . . .	47
Dowitcher. . . . .	38, 39
Long-billed. . . . .	38, 40
Dryobates pubescens homorus . . . . .	59
Pubescens medianus. . . . .	59
Villosus. . . . .	59
Villosus leucomelas. . . . .	59
Villosus monticola. . . . .	59
Duck, Black. . . . .	25, 26
Harlequin. . . . .	24, 29
Lesser scaup. . . . .	25
Mottled. . . . .	28
Old-squaw. . . . .	24, 29

# INDEX

Red-legged black. ....	25, 26	Gavia arcticus. ....	17
Ring-necked. ....	25, 29	Imber. ....	17
Ruddy. ....	24, 30	Lumme. ....	17
Scaup. ....	25, 28	Geothlypis agilis. ....	106
Wood. ....	25, 29	Formosa. ....	104
Eagle, Bald. ....	48, 52	Philadelphica. ....	104
Golden. ....	48, 52	Tolmiei. ....	104
Ectopistes migratorius. ....	47	Trichas brachidactyla. ....	105
Egret, American. ....	32, 33	Trichas occidentalis. ....	104
Egretta candidissima. ....	33	Glaucidium gnoma. ....	56
Elanoides forficatus. ....	50	Gnatcatcher, Blue-gray. ....	112, 113
Elanus leucurus. ....	50	Godwit, Hudsonian. ....	38, 41
Empidonax difficilis. ....	68	Marbled. ....	38, 41
Flaviventris. ....	68	Golden-eye. ....	24, 28
Hammondi. ....	68	Rocky Mountain or Barrow. ....	24, 28
Minimus. ....	68	Goldfinch. ....	77, 84
Traillii. ....	68	Arkansas. ....	77, 92
Traillii-alnorum. ....	68	Western. ....	77, 82
Virescens. ....	68	Goose, Blue. ....	23, 30
Wrightii. ....	68	Cackling. ....	24, 31
Ereunetes occidentalis. ....	41	Canada. ....	24, 30
Pusillus. ....	41	Greater Snow. ....	23, 30
Erismatura jamaicensis. ....	30	Hutchins. ....	24, 30
Falco columbarius. ....	53	Lesser Snow. ....	23, 30
Mexicanus. ....	52	White-fronted. ....	23, 30
Peregrinus anatum. ....	52	Goshawk, American. ....	49, 51
Richardsonii. ....	53	Western. ....	49, 51
Rusticolus. ....	52	Grackle, Bronzed. ....	73, 75
Sparverius. ....	53	Grebe, Eared. ....	16
Sparverius phalæna. ....	53	Holbeck. ....	16
Falcon, Prairie. ....	49, 52	Horned. ....	16
Finch, Cassin purple. ....	77, 83	Pied-billed. ....	16, 17
Purple. ....	77, 83	Western. ....	16, 17
House. ....	77, 83	Grosbeak, Black-headed. ....	78, 82, 91
Flicker, Northern. ....	58, 60	Evening. ....	76, 82
Red-shafted. ....	58, 60	Mountain Pine. ....	76, 83
Florida cærulea. ....	33	Pine. ....	76, 83
Flycatcher, Acadian. ....	66, 68	Rose-breasted. ....	78, 82, 91
Alder. ....	66, 68	Western blue. ....	79, 91
Ash-throated. ....	65, 68	Western Evening. ....	76, 82
Great-crested. ....	65, 67	Grouse, Columbian Sharp-tailed. ....	45, 46
Hammond. ....	66, 68	Dusky. ....	45, 46
Least. ....	65, 68	Prairie Sharp-tailed. ....	45, 46
Olive-sided. ....	65, 67	Ruffed. ....	45, 46
Scissor-tailed. ....	64, 66	Sage. ....	45, 46
Traill. ....	65, 68	Grus americana. ....	34
Western. ....	65	Canadensis. ....	34
Wright. ....	65, 68	Mexicana. ....	34
Yellow-bellied. ....	65, 68	Guara alba. ....	31
Frigate Bird. ....	22	Guiraca cærulea lazula. ....	91
Fulica americana. ....	36	Gull, Bonaparte. ....	19, 20
Gadwall. ....	25, 26	California. ....	18, 21
Galeoscoptes carolinensis. ....	108	Franklin. ....	18, 20
Gallinago delicata. ....	39	Glaucous. ....	15, 21
Gallinula galeata. ....	36	Great Black-backed. ....	18, 19
Gallinule, Florida. ....	35, 36	Herring. ....	18, 19
Purple. ....	35, 36	Iceland. ....	18, 21
		Laughing. ....	18, 20
		Ring-billed. ....	18, 19

# INDEX

Sabine. . . . .	18, 20	White. . . . .	31
Gyr Falcon, Gray. . . . .	49, 52	White-faced Glossy. . . . .	31
		Wood. . . . .	32
Hæmatopus palliatus. . . . .	45	Icteria virens. . . . .	105
Haliæetus leucocephalus. . . . .	50	Virens longicauda. . . . .	105
Harelda hyemalis. . . . .	29	Icterus bullockii. . . . .	75
Hawk, American Rough-legged. . . . .	48, 52	Galbula. . . . .	75
Broad-winged. . . . .	50, 51	Spurius. . . . .	75
Cooper. . . . .	49, 50	Ictinia mississippiensis. . . . .	50
Desert Sparrow. . . . .	49, 53	Introduction. . . . .	3-4
Dick. . . . .	49, 52	Ionornis marticinea. . . . .	36
Ferruginous Rough-legged. . . . .	48, 52	Iridoprocne bicolor. . . . .	94
Harlan. . . . .	50, 51	Ixoreus naevius. . . . .	116
Krider. . . . .	50, 51		
Marsh. . . . .	49, 50	Jaeger, Long-tailed. . . . .	17, 18
Pigeon. . . . .	49, 53	Parasitic. . . . .	17, 18
Red-shouldered. . . . .	50, 51	Pomarine. . . . .	17
Red-tailed. . . . .	50, 51	Jay, Black-headed. . . . .	70, 71
Sharp-shinned. . . . .	49, 50	Blue. . . . .	70
Sparrow. . . . .	49, 53	Canada. . . . .	70, 71
Swainson. . . . .	50, 51	Long-crested. . . . .	70, 71
Western Red-tailed. . . . .	50, 51	Pinion. . . . .	70, 72
Helminthophila celata. . . . .	101	Rocky Mountain. . . . .	70, 75
Celata lutescens. . . . .	106	Woodhouse. . . . .	70, 71
Chrysoptera. . . . .	101	Junco aikeni. . . . .	88
Peregrina. . . . .	101	Caniceps. . . . .	89
Pinus. . . . .	100	Gray-headed. . . . .	78, 89
Rubricapilla. . . . .	101	Hyemalis. . . . .	89
Virginia. . . . .	101	Hyemalis shufeldti. . . . .	89
Helmitheros vermivorus. . . . .	100	Mearnsi. . . . .	89
Helodromas solitarius. . . . .	42	Montanus. . . . .	89
Solitarius cinnamomeus. . . . .	43	Montana. . . . .	78, 89
Herodias egretta. . . . .	33	Pink-sided. . . . .	78, 89
Heron, Black-crowned Night. . . . .	32, 34	Shufeldt. . . . .	78, 89
Great Blue. . . . .	32, 33	Slate-colored. . . . .	78, 89
Green. . . . .	32, 34	White-winged. . . . .	78
Little Blue. . . . .	32, 33		
Snowy. . . . .	32, 33	Killdeer. . . . .	43, 44
Yellow-crowned Night. . . . .	32, 34	Kingbird. . . . .	65, 67
Hesperiphona vespertina. . . . .	82	Arkansas. . . . .	65, 67
Vespertina montana. . . . .	82	Cassin. . . . .	65, 68
Himantopus mexicanus. . . . .	37	Kingfisher, Belted. . . . .	57
Hirundo erythrogastra. . . . .	94	Kinglet, Golden-crowned. . . . .	112
Histrionicus histrionicus. . . . .	29	Ruby-crowned. . . . .	112
Hummingbird, Broad-tailed. . . . .	63	Kite, Mississippi. . . . .	48, 50
Ruby-throated. . . . .	62, 63	Swallow-tailed. . . . .	49, 50
Rufous. . . . .	63	White-tailed. . . . .	49, 50
Hydrochelidon nigra surinamen-		Kittiwake. . . . .	18, 21
sis. . . . .	21	Knot. . . . .	40
Hylocichla aliciae. . . . .	114	Lanius borealis. . . . .	95
Fuscescens. . . . .	114	Ludovicianus. . . . .	95
Fuscescens salicicola. . . . .	114	Ludovicianus excubitorides. . . . .	95
Guttata audubonii. . . . .	115	Lark, Horned. . . . .	69
Guttata pallasii. . . . .	115	Desert Horned. . . . .	69
Mustelina. . . . .	114	Hoyt Horned. . . . .	69
Ustulata almæ. . . . .	115	Prairie Horned. . . . .	69
Ustulata swainsonii. . . . .	114	Larus argentatus. . . . .	19
		Atricilla. . . . .	20
Ibis, Glossy. . . . .	31	Californicus. . . . .	21

# INDEX

Delawarensis. ....	19	Myadestes townsendii. ....	114
Franklinii. ....	20	Myiarchus crinitus. ....	67
Marinus. ....	19	Cinerascens. ....	68
Philadelphia. ....	20		
Leucosticte, Gray-crowned. ....	76, 84	Nettion carolinensis. ....	27
Hepburn. ....	76, 84	Nighthawk. ....	61, 62
Tephrocotis. ....	84	Sennett. ....	61, 62
Tephrocotis littoralis. ....	84	Western. ....	61, 62
Limosa fedoa. ....	41	Nucifraga columbiana. ....	72
Hæmastica. ....	41	Numenius borealis. ....	43
Longspur, Alaskan. ....	77, 85	Hudsonicus. ....	43
Chestnut-collared. ....	77, 85	Longirostris. ....	42
Lapland. ....	77, 84	Nutcracker, Clarke. ....	70, 72
McCown. ....	77, 85	Nuthatch, Pygmy. ....	111
Painted. ....	77, 85	Red-bellied. ....	111
Loon. ....	17	Rocky Mountain. ....	111
Black-throated. ....	17	White-bellied. ....	111
Red-throated. ....	17	Nuttallornis borealis. ....	67
Lophodytes cucullatus. ....	26	Nyctala acadica. ....	55
Loxia curvirostra bendirei. ....	83	Tengmalmi richardsoni. ....	55
Curvirostra minor. ....	83	Nyctea nyctea. ....	56
Curvirostra stricklandi. ....	83	Nyctanassa violacea. ....	34
Leucoptera. ....	83	Nycticorax nycticorax nævius. ....	34
Macrorhamphus griseus. ....	39	Oidemia americana. ....	29
Scolopaceus. ....	40	Deglandi. ....	29
Magpie. ....	70	Perspicillata. ....	29
Mallard. ....	25, 26	Olbiorchilus Hiemalis. ....	109
Man-O'-War Bird. ....	22	Old-squaw. ....	29
Mareca americana. ....	27	Olor buccinator. ....	31
Penelope. ....	26	Columbianus. ....	30
Martin, Purple. ....	93	Oreospiza chlorura. ....	91
Meadowlark. ....	73, 74	Oriole, Baltimore. ....	72, 74, 75
Western. ....	73, 75	Bullock. ....	72, 74, 75
Megascops asio. ....	55	Orchard. ....	72, 73, 75
Asio maxwellii. ....	55	Oroscoptes montanus. ....	108
Melanerpes erythrocephalus. ....	60	Osprey. ....	48, 53
Meleagris gallopavo silvertris. ....	47	Otocoris alpestris. ....	69
Melospiza georgiana. ....	90	Alpestris hoyti. ....	69
Lincolni. ....	90	Alpestris leucolama. ....	69
Melodia. ....	89	Alpestris praticola. ....	69
Melodia juddi. ....	90	Ovenbird. ....	99, 104
Melodia montana. ....	92	Owl, American Hawk. ....	54, 56
Merganser, American. ....	24, 25	Arctic Horned. ....	54, 56
Americanus. ....	25	Barn. ....	53
Hooded. ....	24, 26	Barred. ....	54, 55
Red-breasted. ....	24, 26	Burrowing. ....	54, 56
Serrator. ....	26	Flammulated Screech. ....	54, 56
Merlin, Richardson. ....	49, 53	Great Gray. ....	54, 55
Merula migratoria. ....	115	Great Horned. ....	54, 56
Migratoria propinqua. ....	115	Long-eared. ....	54, 55
Micropalama Himantopus. ....	40	Pygmy. ....	54, 56
Mimus polyglottos. ....	108	Richardson. ....	54, 55
Polyglottos leucopterus. ....	108	Rocky Mountain Screech. ....	54, 55
Mniotilta varia. ....	100	Saw-whet. ....	54, 56
Mockingbird. ....	107, 108	Screech. ....	54, 55
Western. ....	107, 108	Short-eared. ....	54, 55
Molothrus ater. ....	75	Snowy. ....	54, 56
Muscivora forficata. ....	66	Western Horned. ....	54, 56



# INDEX

<i>Oxyechus vociferus</i> .....	44	<i>Rubra</i> .....	93
<i>Oystercatcher, American</i> .....	45	<i>Plegadis autumnalis</i> .....	31
<i>Pandion haliaetus carolinensis</i> ..	53	<i>Guafaua</i> .....	31
<i>Paroquet, Carolina</i> .....	57	<i>Plover, Belted Piping</i> .....	44
<i>Parus atricapillus</i> .....	112	<i>Black-bellied</i> .....	43, 44
<i>Atricapillus septentrionalis</i> ..	112	<i>Golden</i> .....	43, 44
<i>Gambeli</i> .....	112	<i>Mountain</i> .....	43, 44
<i>Passer domesticus</i> .....	84	<i>Semi-palmated</i> .....	43, 44
<i>Passerculus sandwichensis alau-</i>		<i>Snowy</i> .....	44
<i>dinus</i> .....	86	<i>Podasocys montanus</i> .....	44
<i>Sandwichensis savanna</i> .....	85	<i>Podilymbus podiceps</i> .....	17
<i>Passerella iliaca</i> .....	90	<i>Poliophtila cærulea</i> .....	113
<i>Iliaca schistacea</i> .....	90	<i>Poœcetes gramineus</i> .....	85
<i>Passerina nivalis</i> .....	84	<i>Gramineus confinis</i> .....	85
<i>Pedioecetes phasianellus cam-</i>		<i>Poorwill</i> .....	61
<i>pestris</i> .....	46	<i>Frosted</i> .....	61, 62
<i>Phasianellus columbianus</i> .....	46	<i>Porzana carolina</i> .....	35
<i>Pewee, Wood</i> .....	65, 67	<i>Jamaicensis</i> .....	36
<i>Western Wood</i> .....	65, 67	<i>Noveboracensis</i> .....	36
<i>Pelecanus erythrorhynchos</i> ....	23	<i>Prairie Hen</i> .....	45, 46
<i>Occidentalis</i> .....	23	<i>Lesser</i> .....	45, 46
<i>Pelican, Brown</i> .....	22, 23	<i>Progne subis</i> .....	93
<i>White</i> .....	22, 23	<i>Protonotaria citrea</i> .....	100
<i>Pelidna alpina pacifica</i> .....	41	<i>Querquedula cyanoptera</i> .....	27
<i>Perisoreus canadensis</i> .....	71	<i>Discors</i> .....	27
<i>Canadensis capitalis</i> .....	71	<i>Quiscalus quiscula æneus</i> .....	75
<i>Petrochelidon lunifrons</i> .....	94	<i>Rail, Black</i> .....	35, 36
<i>Peucæa æstivalis bachmanii</i> ..	92	<i>Carolina</i> .....	36
<i>Cassini</i> .....	92	<i>King</i> .....	35
<i>Phalacrocorax dilophus</i> .....	22	<i>Virginia</i> .....	35
<i>Dilophus floridanus</i> .....	22	<i>Yellow</i> .....	35, 36
<i>Mexicanus</i> .....	22	<i>Rallus elegans</i> .....	35
<i>Phalænoptilus nuttallii</i> .....	61	<i>Virginianus</i> .....	35
<i>Nuttallii nitidus</i> .....	62	<i>Raven, American</i> .....	70, 71
<i>Phalarope, Northern</i> .....	37	<i>Northern</i> .....	70, 71
<i>Red</i> .....	37	<i>White-necked</i> .....	70, 71
<i>Wilson</i> .....	36, 37	<i>Recurvirostra americana</i> .....	37
<i>Phalaropus lobatus</i> .....	37	<i>Red-head</i> .....	25, 28
<i>Phasianus torquatus</i> .....	47	<i>Redpoll</i> .....	76, 84
<i>Pheasant, Ring-necked</i> .....	47	<i>Greater</i> .....	76, 84
<i>Philohela minor</i> .....	39	<i>Hoary</i> .....	76, 92
<i>Phoebe</i> .....	65, 67	<i>Redstart</i> .....	100, 106
<i>Say</i> .....	65, 67	<i>Regulus calendula</i> .....	112
<i>Pica pica hudsonia</i> .....	70	<i>Satrapa</i> .....	112
<i>Picoides americanus</i> .....	60	<i>Rhynchophanes mccownii</i> ....	85
<i>Arcticus</i> .....	59	<i>Riparia riparia</i> .....	94
<i>Pigeon, Passenger</i> .....	47	<i>Robin</i> .....	113, 115
<i>Pinicola enucleator leucura</i> ....	83	<i>Western</i> .....	113, 115
<i>Enucleator montana</i> .....	83	<i>Salpinctes obsoletus</i> .....	108
<i>Pintail</i> .....	25, 27	<i>Sanderling</i> .....	38, 41
<i>Pipilo erythrophthalmus</i> .....	90	<i>Sandpiper, Baird</i> .....	39, 40
<i>Fuscus mesoleucus</i> .....	92	<i>Bartramian</i> .....	38, 42
<i>Maculatus arcticus</i> .....	91	<i>Buff-breasted</i> .....	39, 42
<i>Maculatus megalonyx</i> .....	91	<i>Least</i> .....	39, 40
<i>Pipit</i> .....	106	<i>Pectoral</i> .....	39, 40
<i>Sprague</i> .....	106	<i>Purple</i> .....	39, 43
<i>Piranga erythromelas</i> .....	93		
<i>Ludoviciana</i> .....	93		

# INDEX

Red-backed.....	29, 41	Mountain Song.....	80, 92
Semi-palmated.....	38, 41	Nelson.....	79, 87
Solitary.....	38, 42	Sage.....	81, 92
Spotted.....	38, 42	Savanna.....	82, 85
Stilt.....	38, 40	Slate-colored.....	82, 90
Western.....	38, 41	Song.....	80, 89
Western Solitary.....	38, 43	Swamp.....	80, 90
White-rumped.....	39, 40	Tree.....	81, 87
Sapsucker, Red-naped.....	58, 60	Vesper.....	82, 85
Williamson.....	58, 60	Western Chipping.....	81, 88
Yellow-bellied.....	58, 59	Western Field.....	81, 88
Saxicola ananthe leucorhoa.....	116	Western Grasshopper.....	82, 86
Sayornis phoebe.....	67	Western Henslow.....	79, 86
Saya.....	67	Western Lark.....	79, 87
Scolecophagus carolinus.....	75	Western Savanna.....	82, 86
Cyanocephalus.....	75	Western Tree.....	81, 88
Scoter, American.....	24, 29	Western Vesper.....	82, 85
Surf.....	24, 29	White-crowned.....	80, 87
White-winged.....	24, 29	White-throated.....	80, 87
Scotiaptex nebulosa.....	55	Spatula clypeata.....	27
Seiurus aurocapillus.....	104	Speotyto cunicularia hypogaea.....	56
Motacilla.....	104	Sphyrapicus thyroideus.....	60
Noveboracensis notabilis.....	104	Varius.....	59
Selasphorus platycercus.....	63	Varius nuchalis.....	60
Rufus.....	63	Spinus pinus.....	84
Setophaga ruticilla.....	106	Spiza americana.....	92
Shoveller.....	25, 27	Spizella breweri.....	88
Shrike, Northern.....	94, 95	Monticola.....	87
Loggerhead.....	94, 95	Monticola ochracea.....	88
White-rumped.....	95	Pallida.....	88
Sialia arctica.....	116	Pusilla.....	88
Mexicana bairdi.....	115	Pusilla arenacea.....	88
Sialis.....	115	Socialis.....	88
Siskin, Pine.....	77, 84	Socialis arizonæ.....	88
Sitta canadensis.....	111	Squatarola squatarola.....	44
Carolinensis nelsoni.....	111	Steganopus tricolor.....	37
Pygmæa.....	111	Stelgidopteryx serripennis.....	94
Snipe, Wilson.....	38, 39	Stercorarius longicaudus.....	18
Solitaire, Townsend.....	113, 114	Parasiticus.....	18
Sora.....	36	Pomarinus.....	18
Sparrow, Bachman.....	80, 92	Sterna antillarum.....	21
Baird.....	82, 86	Caspia.....	20
Brewer.....	81, 88	Forsteri.....	20
Cassin.....	80, 92	Hirundo.....	20
Chipping.....	81, 88	Maxima.....	20
Clay-colored.....	81, 88	Paradisæa.....	20
Dakota Song.....	80, 90	Stilt, Black-necked.....	37
English.....	81, 84	Strix praticola.....	53
European Tree.....	81	Sturnella magna.....	74
Field.....	81, 88	Magna neglecta.....	75
Fox.....	82, 90	Surnia ulula caparoch.....	65
Golden-crowned.....	80, 92	Swallow, Bank.....	93, 94
Grasshopper.....	82, 86	Barn.....	93, 94
Harris.....	80, 87	Cliff.....	93, 94
Henslow.....	79, 86	Rough-winged.....	93, 94
Intermediate.....	80, 87	Tree.....	93, 94
Lark.....	79, 87	Violet-green.....	93, 94
Leconte.....	79, 86	Swan, Trumpeter.....	23, 31
Lincoln.....	80, 90	Whistling.....	23, 30

# INDEX

Swift, Chimney. . . . .	62	Vociferans. . . . .	68
White-throated Rock. . . . .	62	Vireo atricapillus. . . . .	96
Symphemia semipalmata inornata. . . . .	42	Bellii. . . . .	97
Syrnium varium. . . . .	55	Bell. . . . .	96
Tachycineta thalassina lepida. . . . .	94	Black-capped. . . . .	95, 96
Tanager, Louisiana. . . . .	93	Blue-headed. . . . .	95, 96
Scarlet. . . . .	92, 93	Flavifrons. . . . .	96
Summer. . . . .	93	Gilvus. . . . .	96
Tantalus loculator. . . . .	32	Gilvus swainsoni. . . . .	96
Teal. Blue-winged. . . . .	25, 27	Noveboracensis. . . . .	96
Cinnamon. . . . .	25, 27	Olivaceus. . . . .	96
Green-winged. . . . .	25, 27	Plumbeus. . . . .	95, 96
Telmatodytes palustris. . . . .	110	Philadelphia. . . . .	95, 96
Palustris plesius. . . . .	110	Philadelphicus. . . . .	96
Tern, Arctic. . . . .	19, 20	Red-eyed. . . . .	95, 96
Black. . . . .	19, 21	Solitarius. . . . .	96
Caspian. . . . .	19, 20	Solitarius plumbeus. . . . .	96
Common. . . . .	19, 20	Warbling. . . . .	95, 96
Forster. . . . .	19, 20	Western Warbling. . . . .	95, 96
Least. . . . .	19, 21	White-eyed. . . . .	96
Royal. . . . .	19, 20	Yellow-throated. . . . .	95, 96
Thrasher, Brown. . . . .	107, 108	Vulture, Black. . . . .	48
Sage. . . . .	107, 108	Turkey. . . . .	48
Thrush, Alma. . . . .	114, 115	Warbler, Audubon. . . . .	98, 102
Audubon Hermit. . . . .	113, 115	Bay-breasted. . . . .	98, 99, 103
Gray-cheeked. . . . .	114	Blackburnian. . . . .	98, 103
Hermit. . . . .	113, 115	Black-poll. . . . .	98, 99, 103
Olive-backed. . . . .	114	Black-throated Blue. . . . .	98, 102
Varied. . . . .	113, 116	Black-throated Green. . . . .	98, 103
Willow. . . . .	114	Blue-winged. . . . .	97, 100
Wilson. . . . .	113, 114	Black and White. . . . .	98, 100
Wood. . . . .	113, 114	Canadian. . . . .	100, 105
Thryomanes bewickii. . . . .	109	Cape May. . . . .	98, 101
Bewickii bairdii. . . . .	109	Cerulean. . . . .	98, 102
Bewickii cryptus. . . . .	109	Chestnut-sided. . . . .	98, 99, 102
Thryothorus ludovicianus. . . . .	109	Connecticut. . . . .	99, 106
Titmouse, Tufted. . . . .	111, 112	Golden-winged. . . . .	97, 101
Topography of Bird. . . . .	12-13	Hooded. . . . .	100, 105
Totanus flavipes. . . . .	42	Kentucky. . . . .	99, 104
Melanoleucus. . . . .	41	Kirtland. . . . .	98, 106
Towhee. . . . .	78, 90	Lutescent. . . . .	97, 106
Arctic. . . . .	78, 91	Macgillivray. . . . .	99, 104
Canyon. . . . .	79, 92	Magnolia. . . . .	98, 102
Green-tailed. . . . .	78, 91	Mourning. . . . .	99, 104
Spurred. . . . .	78, 91	Myrtle. . . . .	89, 102
Toxostoma rufum. . . . .	108	Nashville. . . . .	97, 101
Tringa canutus. . . . .	40	Northern Parula. . . . .	97, 101
Trochilus colubris. . . . .	63	Orange-crowned. . . . .	97, 101
Troglodytes ædon. . . . .	109	Palm. . . . .	99, 103
Ædon aztecus. . . . .	109	Pileolated. . . . .	100
Tryngites subruficollis. . . . .	42	Pine. . . . .	98, 103
Turkey, Wild. . . . .	47	Prairie. . . . .	99, 104
Turnstone, Ruddy. . . . .	45	Prothonotary. . . . .	97, 100
Tympanuchus americanus. . . . .	46	Sycamore. . . . .	98, 103
Pallidicinctus. . . . .	46	Tennessee. . . . .	97, 101
Tyrannus tyrannus. . . . .	67	Townsend. . . . .	98, 106
Verticalis. . . . .	67	Virginia. . . . .	97, 101
		Wilson. . . . .	100, 105

# INDEX

Worm-eating.....	97, 100	Wren, Bewick.....	107, 109
Yellow.....	99, 102	Canyon.....	107, 108
Water-thrush, Grinnell.....	99, 104	Carolina.....	107, 109
Louisiana.....	99, 104	House.....	107, 109
Waxwing, Bohemian.....	94	Interior Tule.....	107, 110
Cedar.....	94	Long-billed Marsh.....	107, 110
Wheatear, Greenland.....	113, 116	Rock.....	108
Whippoorwill.....	61	Short-billed Marsh.....	107, 109
Widgeon, American.....	27	Texas Bewick Wren.....	107, 109
European.....	26	Western House.....	107, 109
Willet, Western.....	38, 42	Winter.....	107, 109
Wilsonia canadensis.....	105	Xanthocephalus xanthocephalus.....	74
Mitrata.....	105	Xema sabinii.....	20
Pusilla.....	105	Yellowlegs.....	38, 42
Pusilla pileolata.....	105	Greater.....	38, 41
Woodcock.....	38, 39	Yellowthroat, Northern.....	89, 105
Woodpecker, American Three-toed.....	58, 60	Western.....	99, 104
Arctic Three-toed.....	58, 59	Zamelodia ludoviciana.....	91
Batchelder.....	58, 59	Melanocephala.....	91
Hairy.....	59	Zenaidura macroura.....	47
Ivory-billed.....	60	Zonotrichia albicollis.....	87
Lewis.....	58, 60	Coronata.....	92
Northern Downy.....	58, 59	Leucophrys.....	87
Northern Hairy.....	59	Leucophrys gambelii.....	87
Northern Pileated.....	57, 60	Querula.....	87
Red-bellied.....	58, 60		
Red-headed.....	58, 60		
Rocky Mountain Hairy.....	59		













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